Virginia Medical Monthly

Official Publication of the Medical Society of Virginia

Vol. 62, No. 5.
WHOLE No. 998.

RICHMOND, VA., AUGUST, 1935

$2.00 A YEAR
25 CENTS A COPY

THE TREATMENT OF POLIOMYELITIS

THE VIEWS OF VARIOUS STATE COMMISSIONERS OF HEALTH CONCERNING VACCINE IN PREVENTION AND IMMUNE SERUM IN TREATMENT

State	Vaccine in Prevention					Immune Serum in Treatment				
	For	For (with reservations)	Against	No experience	Neutral	For	For (with reservations)	Against	No experience	Neutral
Arkansas			+			+				
Alabama			+					+		
Arizona	+						+			
California		+								+
Connecticut					+			+		
District of Columbia					+			+		
Florida			+					+		
Illinois			+			+				
Iowa			+			+				
Indiana					+			+		
Kansas			+			+				
Massachusetts			+			+				
Missouri			+				+			
Michigan					+			+		
Maryland		+					+			
Maine			+			+				
Montana				+			+			
Nevada			+			+				
New York			+					+		
North Carolina		+						+		
New Mexico				+					+	
Ohio					+					+
Oklahoma	+					+				
Rhode Island	+					+				
South Carolina			+				+			
Tennessee				+				+		
Utah				+		+				
Virginia			+					+		
Washington			+			+				
West Virginia				+						+
Wisconsin				+				+		
Wyoming				+					+	
	3	3	14	7	5	11	5	11	2	3
	6					16				

The above table is based on answers to a letter recently sent by the Editor to all State Health Commissioners, asking their attitude concerning vaccine in prevention and immune serum iu treatment.

THE SERO-DIAGNOSIS OF ENTERIC FEVER WITH SPECIAL REFERENCE TO THE METHOD OF QUALITATIVE RECEPTOR ANALYSIS.*

SAMUEL R. DAMON, Ph.D.,†
Baltimore, Md.

INTRODUCTION

In illness, responsibility for diagnosis rests, ultimately, with the clinician. In making his diagnosis, however, the clinician is entitled to such assistance as may be rendered by the clinical pathologist. That is, the physician should take full advantage of such diagnostic laboratory facilities as are available. Only by doing so can he at times get that information which will confirm his tentative conclusion, based on the observations which he has made at the bedside, or make possible the positive differentiation of conditions closely resembling each other in their physical signs and symptoms.

In the diagnosis of typhoid or paratyphoid fever the foregoing remarks are eminently applicable and yet how frequently resort to laboratory tests, in these enteric fevers, results in confusing the issue. This is particularly true when blood specimens are submitted from suspected cases for serological examination. It is important, therefore, to have an understanding of the limitations to which an immunological test, such as the agglutination reaction, is subject.

DIAGNOSIS BY THE WIDAL TEST

For many years the serological diagnosis of enteric fever was made by the microscopic Widal[1] test in which suspensions of known organisms were incubated with dilutions of the patient's serum in hanging drop preparations. In these tests agglutination was observed when the serum containing the agglutinin was mixed with a suspension of the homologous organism.

Though helpful, this was not a perfect diagnostic test as it was generally negative in early cases and occasionally failed to become positive at any time in some cases clinically diagnosed as typhoid; it involved some risk due to the use of living organisms as antigens, and it was impossible to accurately standardize the bacillary suspension employed. These, and other factors reduced the test to one that was essentially qualitative and not quantitative, the point at issue being the presence or absence of specific agglutinins and not their precise titre in the serum.

In the interpretation of Widal-test results it was soon recognized that the serum of uninfected persons might contain agglutinins in low titre and an attempt was made to overcome this difficulty by setting up diagnostic standards. That is, some such arbitrary standard as complete agglutination in thirty minutes in a dilution of 1:50 of the patient's serum was adopted and reactions as strong as, or stronger than this were regarded as positive, while those occurring in weaker dilutions were considered as negative or, at most, suspicious.

The inherent weakness of such a technique soon became obvious. Bacillary suspensions of the same or different strains varied so in their sensitivity to agglutinins that it was found next to impossible to adopt any particular titre, as marking the probable limit of normal agglutination, that would have the same significance for all laboratory workers.

The one advantage of this microscopic Widal test was that it could be carried out on a small sample of the patient's blood. Thus there was a period in which samples of dried blood were submitted on prescription blanks, blotting paper, calling cards, glass slides, etc.

Furthermore, the increasing use of prophylactic vaccine has still further impaired the value of the Widal test as a diagnostic aid since the serum of vaccinated persons, as well as that of individuals who have had previous enteric fever, may give similar reactions to those obtained in active cases of infection. And, finally, the matter was reduced to a state of utter confusion when it was established that individuals, who at any time had had

*Presented by invitation before the Gibson County Medical Society, Trenton, Tennessee, March 25, 1935.

†From the Department of Bacteriology of the School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

enteric fever or had been prophylactically vaccinated, might give positive agglutination reactions under the stimulus of any febrile condition whatever. This has been referred to by Conradi[2] as the anamnestic reaction.

To recapitulate then, the present status of the sero-diagnosis of enteric fever, by means of the classical Widal reaction, is that agglutination in diagnostic titre may be observed in the patient's serum under the following circumstances:

1. If the patient has or is convalescent from enteric fever.
2. If the patient has had enteric fever at some time in the past and continues to show antibodies in his serum.
3. If the patient has received prophylactic anti-enteric vaccine and continues to show antibodies in his serum.
4. If the patient, suffering from an unrelated febrile condition, exhibits an anamnestic reaction due to previous enteric infection or inoculation with anti-enteric vaccine.

With these limitations in mind and with an increasingly large proportion of the population having received prophylactic vaccination—at least in certain sections of the country—it is obvious that the sero-diagnosis of enteric fever by the classical Widal test is difficult, if not impossible, in many cases.

Conclusion of the discussion at this point might well leave the clinician in a hopeless quandary, but it is believed that further examination of the information available will point the way out of the difficulty. The real point at issue is as to whether there is any means by which agglutinins, due to prophylactic inoculation or a non-specific stimulation, as encountered in an anamnestic reaction, may be distinguished from those produced in response to a veritable infection. The answer to this question is that such a distinction can be made by the method designated by Felix[3-4] as that of Qualitative Receptor Analysis.

THE THEORY OF DIAGNOSIS BY QUALITATIVE RECEPTOR ANALYSIS

In brief, this is an agglutination reaction based on the observations made by Smith and Reagh,[5] and extended by Felix and others, that in a motile bacillus there are two distinct antigens—one associated with the flagellar, and the other with the body or soma of the organism. These have come to be known as the H and O antigens—the reference being to their flagellar and somatic origin—and it is now known that in the inoculated or infected individual each gives rise to its specific antibody. We therefore have H and O antigens and their corresponding and specific H and O antibodies, receptors, or agglutinins. As a corollary to this notion it follows that a non-motile, that is, non-flagellated organism, has no H antigen and its antiserum cannot contain H antibodies.

The usefulness and significance of estimating H and O agglutinins in the blood of patients suspected of having enteric fever lies in the fact that they provide a means by which we may distinguish between the antibodies resulting from immediate infection and those stimulated by vaccine or remaining from an earlier infection, or produced in the course of an anamnestic reaction. This differentiation in the laboratory is accomplished by simple inspection as separate antigens are employed—one especially adapted to show the presence of H agglutinins and the other prepared so as to indicate the content of O agglutinins in the serum of the patient.

In the application of the knowledge now available with regard to H and O agglutinins in the serum of persons having suspected enteric fever, the physician should bear in mind the following facts:

1. In those individuals who have never had enterica or been vaccinated:
   a. H and O agglutinins may at times be present but the titre rarely exceeds 1:50 for the former or 1:100 for the latter.
   b. A titre of 1:100 for the H antibody is diagnostic and indicates the infecting species.
   c. A titre of 1:200 for the O antibody may be taken as indicative of enteric infection but does not identify the infecting organism.
   d. In those cases where O antibodies alone are present the diagnosis can only be "enteric infection, type undifferentiated."
2. In individuals who have had previous enterica or been vaccinated:
   a. When antibody formation has been stimulated by either active acquired infection or by vaccination both H and O agglutinins are formed in most cases. However, the O antibodies disappear rapidly—usually in about six months—and do not re-appear except as the result of specific

stimulation. On the other hand, the H agglutinins disappear more slowly and may subsequently reappear as the result of non-specific stimulation.

b. H agglutinins are of no value in diagnosis in these cases except in those instances where a monovalent vaccine has been used and the H antibodies detected in the diagnostic test are for one of the other organisms in the typhoid-paratyphoid group.

c. The detection of O agglutinins in any single diagnostic test in a titre of 1:200 is generally significant of active infection but does not identify the infecting species.

d. A marked rise in the O agglutinin titre in repeated tests makes possible a definite diagnosis of "enteric fever, type undifferentiated."

e. In the presence of a high H agglutinin titre but no rise in the O titre enteric infection is ruled out and the agglutination accounted for on the basis of an anamnestic reaction.

If, at this point, then, we assume that the laboratory is prepared to analyze the antibody content of the patient's serum by the method of qualitative receptor analysis, the question that presents itself to the clinician is as to the interpretation of the results in the types of individuals that he may have to deal with, namely, those that *have not* had previous enteric fever or been vaccinated and those that *have* had previous enteric infection or been vaccinated.

APPLICATION OF QUALITATIVE RECEPTOR ANALYSIS

A. H and O agglutination in persons who have not had pervious enterica or vaccinations.

Before attempting to evaluate the results of specific tests in individuals falling in this category the possibility that these agglutinins may *normally* be present in such sera must be disposed of and experience shows that sometimes such may be the case. In these instances, however, the titre is low, seldom exceeding 1:50 for the flagellar (H) antibody or 1:100 for the somatic (O) antibody.

With regard to the relative titres of the two antibodies in patients no hard and fast rule applies. That is, the laboratory may find that in an uninoculated individual suffering from enteric fever, the titre of one antibody may be less than, may be the same as, or may exceed the other. As a general thing, however, in such patients a titre of 1:100 for the H antibody may be taken as diagnostic and as indicating the infecting species inasmuch as the flagellar agglutinins are species specific.

In those instances, though, in which the infecting organism is a non-motile variant of the normally motile typhoid bacillus, there will, of course, be no H antibodies in the patient's serum. Under these conditions the titre of O agglutinins only will be reported and as the somatic antigen is common throughout the typhoid-paratyphoid group the diagnosis can only be "enteric infection, type undifferentiated." Regardless of the motility of the infecting organism, though, a titre of 1:200 for the O antibody should be demonstrable before being taken as significant of infection.

As illustrating the antibody response, in terms of flagellar and somatic antibodies, in uninoculated patients with no history of previous enteric fever, the cases in Table 1 may be taken as typical. In interpreting these results the presence of H agglutinins in diagnostic titres is obvious but the appearance of O antibodies in significant titre should also be noted. The absence of confusing H antibodies for the heterologous organisms and the appearance of group O agglutinins in low dilution only, are also worthy of note, and, lastly, the significant rise in antibody titre as demonstrated in samples taken at intervals of but a few days is to be regarded as of the utmost importance in diagnosis.

B. H and O agglutination in persons who have had previous enterica or vaccination.

It is in the examination of sera from patients having histories of previous enteric fever or prophylactic vaccination that the method of qualitative receptor analysis finds its greatest usefulness. In these cases the classical Widal loses its value because it may be positive due to (1) residual agglutinins produced under the stimulus of either the earlier infection or vaccination or (2) recalled in the course of an anamnestic reaction due to an unrelated febrile condition. Experience has shown, however, that this agglutination is due almost exclusively to the presence in the serum of antibodies that react only with the flagellar antigen in the organisms used in setting up the Widal tests. In other words, it has been observed that whereas both H and O anti-

TABLE 1

AGGLUTINATION REACTIONS IN TERMS OF H AND O ANTIBODY RESPONSE IN THE SERA OF PATIENTS WITH ENTERIC FEVER. NON-VACCINATED INDIVIDUALS.

Case	Day of Illness	Blood Culture	Serum Dilution	Agglutination Reactions						Remarks
				B. Typhosus.		B. Para A.		B. Para B.		
				H.	O.	H.	O.	H.	O.	
1	9	B. typhosus	1-50	+	+	—	+	—	+	Typhoid fever
			1-100	+	+	—	—	—	+	
			1-200	+	+	—	—	—	—	
			1-400	+	—	—	—	—	—	
2	14	B. paratyphosus Beta	1-50	—	+	—	+	+	+	Paratyphoid fever
			1-100	—	+	—	±	+	+	
			1-200	—	—	—	—	+	+	
			1-400	—	—	—	—	+	—	
3	8	B. paratyphosus Alpha	1-50	—	+	+	+	—	+	Paratyphoid fever
			1-100	—	+	+	+	—	+	
			1-200	—	—	+	±	—	—	
			1-400	—	—	+	—	—	—	
4	7	Sterile	1-50	—	+	—	+	—	+	Serologically enteric fever
			1-100	—	+	—	—	—	+	
			1-200	—	+	—	—	—	—	Type undifferentiated but the increase in the "O" titre for *B. typhosus* strongly suggests typhoid infection.
			1-400	—	+	—	—	—	—	
	10	Sterile	1-50	—	+	—	+	—	+	
			1-100	—	+	—	—	—	+	
			1-200	—	+	—	—	—	—	
			1-400	—	+	—	—	—	—	
			1-800	—	+	—	—	—	—	

bodies are produced in enteric fever and as a result of prophylactic vaccination, the O agglutinins often disappear rapidly, that is, in the course of a few months, while the H or flagellar antibodies persist for a much longer time. Another observation that it is necessary to recognize, is the fact that when the O or somatic agglutinins have been lost from the serum, it is a permanent loss in contrast to the fluctuations of the H antibodies, which may be demonstrable for an indefinite period or may disappear for a time, only to reappear again under the stimulus of a new enteric infection, a new inoculation, or an unrelated febrile state.

From the foregoing, then, it would seem that a relatively high titre of O agglutinins would have a greater diagnostic significance than the same or a higher titre of H antibodies in the serum of a person who has had previous enterica or been vaccinated.

As a matter of fact, sero-diagnosis by the method of qualitative receptor analysis in patients with a history of previous infection or inoculation, is based entirely on the content of O antibodies. If the titre of these agglutinins equals 1:200 it should be considered as probably indicating active infection—unless the vaccination has occurred within six months—and as it exceeds this figure its significance proportionally increases. From this it is obvious, then, that very important information will be obtained by repeated tests, made at intervals of a few days or a week, a sharp rise in titre of the O antibodies being construed as positive evidence of active infection.

The results of typical tests on sera falling under this heading are presented in Table 2. From these tests it will be seen that although the sera in most cases contained both H and O antibodies on first examination, it is the titre of or rapid rise in the O agglutinins that established the diagnosis of "enteric infection"—without indicating the species of the infecting organism—as the appearance of the H antibodies bears no significance due to the earlier prophylactic inoculation.

C. H and O agglutination in cases exhibiting the anamnestic reaction.

Finally, there remains to be considered the possibility of the non-specific stimulation of antibody production in a patient having a history of previous enterica or inoculation. This response simulates the antibody rise seen in infection in an inoculated person unless the serum is analyzed for its content

TABLE 2

AGGLUTINATION REACTIONS IN TERMS OF H. AND O. ANTIBODY RESPONSE IN THE SERA OF PATIENTS WITH ENTERIC INFECTION. VACCINATED INDIVIDUALS.
(T. A. B. VACCINE)

Case	Day of Illness	Serum Dilution	Agglutination Reaction						Remarks
			B Typhosus.		B. Para A.		B. Para B.		
			H.	O.	H.	O.	H.	O.	
1	12	1-50	+	+	+	—	+	+	Serologically typhoid fever. *B. typhosus* isolated from blood.
		1-100	+	+	+	—	+	—	
		1-200	+	+	—	—	+	—	
		1-400	+	+	—	—	+	—	
2	14	1-50	+	+	+	+	+	+	Serologically typhoid fever. *B. typhosus* isolated from stool.
		1-100	+	+	+	—	+	+	
		1-200	+	+	+	—	+	—	
		1-400	+	+	—	—	—	—	
3	9	1-50	+	+	+	+	+	+	Serogically Para A infection. *B. paratyphosus. A* isolated from blood.
		1-100	+	±	+	+	+	±	
		1-200	+	—	+	+	+	—	
		1-400	+	—	+	+	+	—	
	10	1-50	+	+	+	+	+	+	Serologically Para B infection. *B. paratyphosus B,* isolated from blood.
		1-100	+	+	+	+	+	+	
		1-200	+	—	+	—	+	+	
		1-400	±	—	—	—	+	+	
4	16	1-50	+	+	+	+	+	+	Note the rise in the *B. paratyphosus B,* "O" agglutinins..
		1-100	+	+	+	+	+	+	
		1-200	+	+	+	—	+	+	
		1-400	+	—	—	—	+	+	
		1-800	+	—	—	—	+	+	
		1-1600	—	—	—	—	+	+	

of H and O agglutinins. If this analysis is not made, it appears, in examining such sera by the classical Widal test, that there is a marked rise in specific agglutinins. However, when the method of qualitative receptor analysis is employed, it is found that the increase has been in the H antibody only. Such an increase in titre of the flagellar agglutinins without a concomitant rise in the O antibody is to be interpreted as an anamnestic reaction and as having no diagnostic significance. However, if this increase in H titre should be accompanied by a significant increase in the O titre it would indicate that we were dealing with a case of enteric group infection and the diagnosis could be made on this basis. The results of typical tests on sera falling into this category are presented in Table 3.

TABLE 3

ANAMNESTIC REACTION. AGGLUTINATION REACTION IN TERMS OF H AND O ANTIBODY RESPONSE IN THE SERA OF PATIENTS SUFFERING FROM VARIOUS NON-TYPHOID DISEASES. INOCULATED INDIVIDUALS.

Case	Day of Illness	Serum Dilution	Agglutination Reactions						Remarks
			B Typhosus.		B. Para A.		B. Para B.		
			H.	O.	H.	O.	H.	O.	
1	12	1-50	+	—	—	+	—	—	Agglutination due to monovalent typhoid vaccine. Nature of illness unknown.
		1-100	+	—	—	+	—	—	
		1-200	+	—	—	—	—	—	
		1-400	+	—	—	—	—	—	
2	14	1-50	+	+	+	—	+	+	Agglutinates *B. Proteus* X19 1-2000. Reaction due to T. A. B. vaccine.
		1-100	+	—	+	—	+	—	
		1-200	+	—	±	—	+	—	
		1-400	+	—	—	—	+	—	
3	22	1-50	+	+	+	+	+	+	Agglutinates *B. melitensis* 1-2560. Reaction due to T. A. B. vaccine.
		1-100	+	+	+	±	+	+	
		1-200	+	—	—	—	+	—	
		1-400	+	—	—	—	±	—	

SUMMARY

From the preceding discussion it appears that:

1. In any suspected case of enteric infection direct diagnosis by blood culture should always be attempted.

2. In any case of suspected enteric infection the true history of the patient with regard to previous enterica or inoculation *must* be ascertained before an intelligent interpretation of any serological tests can be made.

3. In suspected cases having no history of previous enteric infection or prophylactic vaccination a titre of 1:100 for the H agglutinin is diagnostic and indicates the infecting species. In those instances where a non-motile variant of an enteric organism is the infecting agent a titre of 1:200 for the O antibody should be demonstrable before being taken as significant but does not indicate the species causing the infection. Under such circumstances, the diagnosis can only be "enteric infection, species undifferentiated."

4. In suspected cases having a history of previous enterica or prophylactic vaccination with a polyvalent vaccine the H antibodies demonstrated have no diagnostic significance, whereas the finding of O agglutinins in titres of 1:200 or over permits the definite diagnosis of "enteric infection, species undifferentiated." In those instances where a monovalent vaccine has been employed demonstration of H antibodies for the heterologous organisms is of the same significance as in the uninoculated.

5. In suspected cases having a history of previous enterica or prophylactic inoculation in which an increase in the H antibody only is demonstrated, the diagnosis of enterica is definitely ruled out and the agglutination accounted for on the basis of an anamnestic reaction.

6. In any suspected case a marked rise in titre for the O agglutinins, as determined in tests made at intervals of a few days, is of the greatest significance in establishing the diagnosis.

REFERENCES

1. Widal, F.: *J. de Med. et. Chir. Prat.*, 1896, p. 533.
2. Conradi, H., and Bieling, R.: *Deutsch. Med. Wchnschr.*, 1916, 42, 1280.
3. Felix, A.: *Ztschrf. f. Immunf.*, 1923.
4. Felix, A.: *J. Immunol.*, 1924, 9, 115.
5. Smith, T., and Reagh, A. L.: *J. Med. Res.*, 1903-4, 10, 89.

615 North Wolfe Street.

SURGICAL TREATMENT OF 183 CONSECUTIVE THYROID CASES WITH NO MORTALITY.*

GUY W. HORSLEY, M. D.,
Richmond, Va.
From the Surgical Department, St. Elizabeth's Hospital.

This is a study of a series of consecutive thyroid cases operated upon at St. Elizabeth's Hospital, Richmond, Virginia. It includes all cases from October 1, 1923, to July 1, 1934, and while the series is not large, 183 in all, it includes almost all types of thyroid disease, and there were no operative mortalities. These cases have been followed as well as possible, and the results have been carefully analyzed. The ages range from a girl five years of age, who had a marked exophthalmic goiter, to a woman seventy years of age.

Within the past ten years there has been a marked revolution in thyroid surgery. Previous to this time it was considered very dangerous to operate upon extremely toxic cases, and if these cases finally required an operation, it was done in multiple stages. First, the superior thyroid arteries were ligated and the removal of the thyroid lobes was done separately and at different times. Even with this extreme care the mortality was high, and deformity of the neck due to multiple operations and a disfiguring scar often resulted even if the patient survived.

Beginning with the use of iodine pre- and postoperatively, the practice of Crile's operative technic, and the intravenous administration of dextrose in Ringer's solution, the mortality rate has fallen and

*Read before the sixty-fifth annual meeting of the Medical Society of Virginia, at Alexandria, Va., October 9-11, 1934.

the end-results have been most gratifying. The operative treatment of toxic thyroid cases is no longer looked upon as a grave procedure and a large majority of these cases come out with practically invisible scars and excellent therapeutic results. Multiple operations and the tying of the thyroid vessels as a primary procedure is a thing of the past. We have followed the principles of a definite procedure in all our thyroid cases in both the toxic and non-toxic, but have varied the details to suit the individual case. All thyroid patients have a basal metabolism test before operation. If the metabolism rate is high, that is 30 plus or above, the patient is kept in bed several days with ice caps to the neck and is given iodine and sedatives. The metabolism test is repeated and when it is below plus 30 and the general toxic symptoms have subsided, the operation is done. If the patient is not a toxic case, then the pre-operative treatment is short and simple, the patient being required to stay in the hospital the night preceding operation and only the regular routine procedures are carried out.

We have found the use of avertin to be a great aid and now almost indispensable as a basal anesthetic. Before the advent of avertin we used the so-called "gas treatment." The patient was brought quietly to the operating room at the hour usually fixed for operation, and while still on the stretcher, oxygen with small amounts of ethylene was given. This was repeated each day, before giving the patient breakfast and increasing the amount of ethylene until finally the patient was completely anesthetized and the operation was performed. The patient became excited and the pulse rapid after the first two such treatments, but was soon accustomed to such experiences and at the time of operation no excitement was noticeable. This is the procedure of "stealing the thyroid," initiated by Crile.

With the use of avertin we now have a simpler and most satisfactory method. A small saline enema is given in the morning before breakfast every day. On the day of operation the avertin is given in the enema and the patient goes to sleep in bed. As a rule we use from 75 to 85 mgms. of avertin per kilogram of body weight, but this dose must be varied with the individual. The more toxic the patient, the large the amount of avertin will be required to produce sleep. The avertin is always supplemented with ethylene in the operating room.

The principles of gentleness and careful technic are most valuable and, along with the method of leaving the posterior portion of the thyroid, the recurrent laryngeal nerves, and the parathyroid glands untouched and not dissecting out the neck structure, as has been stressed by Crile, have been faithfully followed. The results which we have obtained demonstrate the value of this method.

Fig. 1.—Mrs. F. C. D. Operated upon March 9, 1934. Picture taken eight days after operation. The subcuticular suture is still in place.

The incision is made curved slightly downward from the sternomastoid muscles on one side to a corresponding point on the other side. The lower portion of the incision at the midline of the neck is about one and one-half inches above the sternum. The skin flaps are dissected up and down, and the ribbon muscles are split longitudinally from the larynx to the sternum. The isthmus of the thyroid is then divided in the midline down to the fascia covering the trachea, care being taken not to injure this latter structure. On the right side the isthmus is dissected from the trachea and the dissection is carried along the upper border of the lobe where its attachments are clamped and divided. The lobe now comes easily into the wound, and the vessels along its outer margin are clamped. With the vascularity blocked off in this way, the lobe is dissected

up in such a manner that a thin layer of thyroid tissue is left covering the recurrent laryngeal nerve, the parathyroids and the tissues about them. This same procedure is repeated on the other lobe of the thyroid.

Fig. 2.—Mr. J. H. P. Operated upon May 22, 1934. Picture taken fourteen days after operation. The s.w.g suture has been removed, leaving no suture marks.

All bleeding is controlled by ligating the larger vessels and by whipping over the thyroid tissue with plain catgut in a fine needle. The ribbon muscles are then sutured together and a small rubber tube is placed between them as a drain. This drainage tube is brought out through the middle of the incision. The subcuticular tissue and the platysma are united with plain catgut and the skin is sutured in two sections with a subcutaneous stitch of silkworm gut. The tube drains blood-tinged serum for the first twenty-four to forty-eight hours, after which time it is removed.

There was no injury to the recurrent laryngeal nerve in any of these cases. Immediately after operation we always watch carefully for any impairment or change in tone of the voice. This has not been found in any case.

Only one case had, apparently, any injury to the parathyroids, and this was expressed by postoperative tetany. The tetany was easily controlled by the use of calcium and parathormone. Both of these therapeutic measures were discontinued after several months without the recurrence of the tetany.

In this series of cases there has been no postoperative bleeding, and no secondary closure of the wound has been necessary. Only one toxic case was closed without drainage and after twenty-four hours this patient became so toxic that the central portion of the wound had to be opened and a small drainage tube inserted, after which the patient's convalescence was normal. The drainage tube not only prevents the collection of serum beneath the ribbon muscles, but also removes any thyroxin that might have been squeezed into the wound during the operation. This type of operation is not as pretty from an anatomical point of view as when a wider dissection is done and all of the surrounding structures are exposed and recognized, but it is more biological and consequently gives better results.

All toxic cases are given dextrose in Ringer's solution intravenously during and after the operation, and, as a rule, this is run continuously for the first twenty-four to forty-eight hours. It has been found to diminish greatly the post-operative toxicity, for it furnishes carbohydrates as a buffer to be burned instead of the body tissues. Since some of these patients have discomfort in swallowing, dehydration might occur if they had to depend entirely upon fluids by mouth. The administration of fluid

Fig. 3.—Mrs. M. L. H. Operated upon October 26, 1927. Picture taken three months after operation.

by proctocylsis and hypodermoclysis could be done, but in neither of these methods could dextrose be satisfactorily and sufficiently absorbed to combat thyrotoxicosis.

The youngest toxic case was that of a girl, five

years of age, who had, apparently, a metabolism rate of plus 70, operated upon in April, 1931. Due to the extreme toxicity and the age of the patient, we were unable to determine accurately the metabolism. There was a definite exophthalmos and the pulse rate before operation ranged from 140 to 170. She was treated in the usual way, as outlined above, but because of the small size of her veins she was not given much dextrose intravenously at first. The second day she became quite toxic and looked very sick. At this time an intravenous cannula was inserted and she was given dextrose in Ringer's solution by this method. The pulse and temperature immediately began to subside, and within twenty-four hours her toxic symptoms disappeared. Her remaining stay in the hospital was uneventful. She has had no subsequent trouble and is now a normal child in every respect.

Ice caps to the head, heart and neck are applied and kept in place constantly until the temperature and pulse are satisfactory. If the temperature is high, 103 or above, ice packs may be used. However, this has not been necessary within the past six years. Iodine is continued in the toxic cases, being given by rectum for the first two or three days, and when nausea has ceased, it is given by mouth. The dextrose in Ringer's solution is given intravenously every day until the patient is able to take sufficient amounts of food and fluid by mouth; this often occurs on the first or second post-operative day. The drainage tube is removed on the second or third day, and the sutures are removed about the eighth day. During this time the incision is dressed and the drainage tube track probed every day to prevent the accumulation of fluid under the skin. These patients are usually kept in the hospital from nine to twelve days. A check-up metabolism test is done on each of these patients before leaving the hospital. This has been found to be very useful in the after-care of these cases.

The diagnosis on the total series of 183 cases is divided into three groups: the toxic, non-toxic, and malignant. There were 118 toxic cases, including both the simple cases of hyperthyroidism and the exophthalmic cases; sixty-one non-toxic cases, and four cases of malignancy. The non-toxic cases were those of cystic and fetal adenomas and simple colloid goiter. The four malignant cases were all adenocarcinoma, from grades 3 to 4 plus.

As has been stated, these cases have been followed and recently all were sent a questionnaire asking about their condition subsequent to operation and at present. One hundred and twenty-one (121) replies were received. This questionnaire contained ten questions comprising the return of the pre-operative symptoms, gain in weight, recurrence of neck enlargement, interference with swallowing, results of the scar, and the patient's opinion of the results of the operation. There are only three patients who were not absolutely sure that the results were excellent, and all of these were very toxic cases. One of these three answered "no" to all questions, and, incidentally, is a mental case, and had been and is now in a neuropathic institution. The other two have apparently mild recurrences of their pre-operative symptoms, since they state that they still have occasional attacks of nervousness, tremor and cardiac palpitation. They refuse any further examination; consequently, the exact nature of their results cannot be accurately ascertained. About 60 per cent of all cases reported a gain in weight. This percentage was larger in the toxic cases than in the non-toxic ones. Only five had noticed any pulling or difficulty in swallowing at any time, and in those five cases this had been transient and not present when question was answered. Three cases reported slight discomfort from the scar, the majority saying that the scar never caused any symptoms and was practically invisible.

Fig. 4.—Mrs. V. W. B. Operated upon August 5, 1927. Picture taken eight months after operation, showing that the scar is practically invisible.

Three cases required a second operation. They were very toxic and young individuals with a metab-

olism of plus 40 to plus 56 before operation. Following the first operation there was apparently a rapid regeneration of the remnant of the thyroid tissues with resultant recurrence of the symptoms. After the second operation the symptoms have disappeared and the metabolism has remained normal or below normal. It has been our experience that the best results are obtained in toxic cases if the metabolism is definitely minus soon after the operation, since there is always slight regeneration of the remaining thyroid tissues.

Of the four carcinomas of the thyroid, one case now has local and bone metastases after four years; one case has no evidence of recurrence after three years; one case died of recurrence in two months; and the fourth had no evidence of recurrence when last heard from, eighteen months after operation. In the treatment of these cases the tumor was excised and radium inserted at the time of operation. This was further supplemented by X-ray therapy over the thyroid region before the patient left the hospital and again in a period of several months.

Discussion

DR. C. BRUCE MORTON: I enjoyed this paper very much, and I think it is a very nice presentation of results which are so satisfactory now that there has been so much relatively recent improvement in the treatment of thyroid disease.

There has been great improvement in results in recent years, and everyone realizes that it is due chiefly to pre-operative preparation of these patients, to some degree to the operative technique, and to a great degree to post-operative care. Iodine has made the treatment of thyroid disease a very different matter than what it used to be.

There is one point which might be stressed, the patient's general condition, as expressed in the weight especially. We have found that of very great importance. A patient, even though the metabolism may be going down, or may be down fairly satisfactorily, will stand the operation much better when the weight is on the upgrade, than in instances when the weight is stationary or not going up.

Concerning the technique of the operation as described, very little can be added. A great many surgeons prefer the division of the ribbon muscles so as to obtain a more adequate exposure, certainly with large goiters and some vascular goiters. It makes possible the ligation of the main vessels of the thyroid before the thyroid tissue is actually incised; it does minimize the bleeding to some extent.

Another technical feature which we use to advantage, I believe, is the introduction of drainage tubes at the angles of incision rather than through the center. I have seen central drains, particularly if the drainage has been for any reason a little more persistent than usual, form a cicatrix which may adhere to the deeper structures and cause dysphagia, which is very unpleasant to the patient.

Dr. Horsley mentioned the height of the incision from the sternum as an inch and a half. I am under the impression that our incision is usually lower, so that the scar of the incision lies in the region covered by a small necklace. I see from his pictures, however, that the incision seems to be a little lower than the inch and a half mentioned would indicate.

We have found it occasionally necessary to do stage operations, ligation of vessels. We had a woman not long ago with a very toxic thyroid complicated by a pregnancy, in which the ligation did seem to be desirable. Even so, she had a very acute reaction after the thyroidectomy. The reaction responded promptly, however, to ice packs and the use of cold infusions.

DR. STUART MCGUIRE, Richmond: I congratulate Dr. Horsley sincerely on the long series of goiter cases he is able to report treated at St. Elizabeth's Hospital without a death and with such satisfactory results. The record is especially creditable when it is remembered that many of the cases were treated ten years ago at a time when the management of thyroid disease was not understood as it is today.

When I begun to operate on goiter patients, more than thirty years ago, the dangers of the operation were listed under five heads, namely: the anesthetic, hemorrhage, shock, infection, and injury to the recurrent laryngeal nerve.

After Kocher, of Switzerland, and Halsted, Mayo, Crile and others in America had perfected the technique of the operation, then for the first time was the danger of an acute hyperthyroid flare-up after the operation fully realized. In order to lessen the last named danger, various modifications were made in the method of handling these patients. The anesthesia was changed from chloroform and ether to gas oxygen, ethylene or the local use of novocaine. Preliminary ligation of the superior thyroid artery was practiced by many surgeons on many cases. The wound was often left open, packed with gauze, and not closed for several days in order to give complete drainage. Finally, in bad cases operation was often done in several stages sometimes a bad case being operated on four or five times before the work was completed. It was not until the introduction of the basal metabolism test, which came into general use about twenty years ago, that the surgeon was able to tell the danger of an acute hyperthyroid reaction in a given case, and was able to measure the efficiency of the various means that were employed to prevent or combat it. It was not until this time that the surgeon fully realized the great necessity of the proper preparation of a patient before the operation.

Some years ago it was generally believed, owing to the teaching of Kocher and Halsted, that iodine was very bad for these cases. Surgeons who used iodine for the

preparation of the skin in other operations avoided it in goiter. It was not until Plummer ten years ago introduced the administration of iodine in the form of Lugol's solution in the preparation of patients that this fallacy was overcome.

With the perfection of the modern technique of operation by which hemorrhage is prevented and injury to the recurrent laryngeal nerve is avoided, with the introduction of the basal metabolism test by which the danger of acute hyperthyroidism can be estimated, and with the administration of iodine by which patients can be gotten in good condition for operation, the surgery of goiter has now been rendered safe and easy. We no longer fear a general anesthetic under gas oxygen or ethylene. We no longer do preliminary ligations or many stage operations, but, by the preparatory treatment so well described by Dr. Horsley, we are able to do a complete one-stage operation without mortality in 99 out of 100 patients. The cases that still give us an occasional death are the patients with a badly damaged heart from long continued thyrotoxic poisoning. These late neglected cases are not seen now as often as they were in the past. In fact, goiter surgery has become so easy that it has ceased to be exciting.

DR. L. D. KEYSER, Roanoke: I think Dr. Horsley is to be highly commended for the presentation of this series of cases, as it shows what coordination of various factors in approaching thyroid disease will accomplish.

There are certain types of cases, however, where I feel that the operation of thyroidectomy, as Dr. McGuire has said, is still of intense interest in taxing our surgical resources. I have two cases that I wish to present as illustrative of this point. One of these had a huge, hard gland, present for several years, which proved to be an infiltrating carcinoma. In the process of removal, we found no line of cleavage. The landmarks were all obliterated. Current opinion is uniform in the belief that the best treatment here is to remove as much of the tissue as possible surgically, and then to treat residual tissue by X-ray therapy. This patient presented tremendous technical difficulties at operation because of the size of the gland and the extensive infiltration present.

However, with the electric knife, we did finally remove most of the tissue, something over a pound in weight. The remainder responded very nicely to X-ray treatment. Microscopic section showed adenocarcinoma Grade II. It is now six months since her operation. The patient has an excellent scar and no evidence of recurrence.

The next case is that of a huge intrathoracic goiter in a blind man sixty-two years of age. This case also presented technical difficulties in the delivery of the lobes from the chest. We were able to bring them out, using Leahey's method of traction from above with digital pressure from below. A huge cavity was left. After a stormy convalescence, the patient temporarily recovered. However, pathological examination revealed adenocarcinomatous degeneration, Grade IV. X-ray, while being tried, will be of little avail here.

These groups of cases will certainly threaten our records at times, as we strive to keep our mortality near the zero point.

DR. J. SHELTON HORSLEY, Richmond: Among the cases reported by Dr. Guy W. Horsley there is one of total thyroidectomy for heart failure. This case was worked out very fully by my partner, Dr. Douglas G. Chapman, and I did the operation. The patient, in addition to his cardiac condition, had marked pain over the gall-bladder, and X-ray examination some time before the operation on the thyroid seemed to show there was distinct disease of the gall-bladder. It was thought, however, that, in view of his rather critical cardiac condition, it was wise to better this first, thinking also that possibly the pain over the gall-bladder might be due to the cardiac condition. I did the total thyroidectomy according to the method of Blumgart and his associates of Boston. The operation is rather tedious and differs technically from a subtotal thyroidectomy because of the practically normal thyroid condition and also because of the necessity for avoiding injury to the recurrent laryngeal nerves and the parathyroids.

The patient made a satisfactory recovery, but nine days after the operation he had a typical gall-bladder attack. Fifteen days after the thyroidectomy I removed the gall-bladder.

His sense of pain, discomfort, and oppression in the chest has been almost entirely relieved but he now has rather marked ascites and is still under observation by Dr. Chapman.

OBSTETRICAL SHOCK.*

M. PIERCE RUCKER, M. D.,
Richmond, Va.

Any one who has practiced medicine for a number of years has cases that stand out as if etched in his memory. The majority of my cases that belong to this class are those of obstetrical shock. I thought that a clinical review of them might prove interesting to you.

John Collins Warren described shock as a momentary pause in the act of death. This strikes one as

very apt description, especially when one has the responsibility of the patient in shock. Every war brings a renewed interested in the subject of shock in general, and many great names in the history of medicine are associated with its study—Paré, Weir Mitchell, Erlanger, Crile, and Cannon, to mention only a few,—until now we have a fairly accurate idea as to what happens in traumatic shock. Blalock in his Arthur Dean Beven lecture has given us an interesting and authorative review of the subject to date. The shock that sometimes follows the puncture of a body cavity, i. e., paracentesis, or the emptying of an over-distended viscus, such as the urinary bladder in prostatic enlargement, is not so well understood. Obstetrical shock occupies an intermediate position between these two groups.

Obstetrical shock may be divided into three groups: (a) that due to hemorrhage; (b) other conditions well recognized as causing shock that may be concomitant with labor; (c) shock with no discoverable cause. The first group needs no explanation. The second group includes such conditions as ruptured appendix, perforating gastric ulcer, ovarian cyst with twisted pedicle, etc. They are to be borne in mind because they may occur in labor and are then very difficult to diagnose. Unfortunately the diagnosis usually is not made until an autopsy is done. I know of one case of duodenal ulcer that belongs in this group. Wehrung and Nerson have recently reported a very instructive case. A thirty-two-year-old XI-para went into shock one and one-half hours after a normal labor and died one-half hour later. Autopsy showed two liters of blood in the periotoneal cavity and a necrotic cyst of the right ovary the size of an adult's head. Furthermore, there was a cancer that partially encircled the colon and a perisigmoidal abscess. It is the third group, in which hemorrhage plays no etiological role and in which there is no discoverable cause, that I wish to discuss today.

CASES

No. 1,776, W., F., M., aet. 40. Patient has been married twenty-two years. She has four living children. One child was delivered at seven and one-half months on account of pre-eclampsia. The baby lived only a few days. There have been two miscarriages. Since her pre-eclampsia in 1919, her blood pressure has been high, usually 180 systolic. On November 29, 1920, she tripped and fell in the backyard, and fainted. She then began to have backache off and on and a little vaginal bleeding. In the afternoon of December 5th, she began to pass clots and was admitted to the Memorial Hospital at 9 P. M. Her pulse was 90 and her color was good. She was three months' pregnant. At 2 A. M., the fetus was lying in the cervix and was removed with placental forceps. The patient became almost pulseless. Systolic pressure was 40. Seven hundred c.c. of normal salt solution were given under the skin. Her color became better and in an hour's time the blood pressure rose to 80. Her convalescence was uneventful and the patient was discharged from the hospital December 11th in good condition. It is interesting to note that in 1931 she had a stroke of apoplexy. She has now a residual paralysis in the left leg and drags the left foot when she walks.

No. 2,161, W., F., M., aet. 23. There is nothing noteworthy in her family history nor in her past history, except that in 1919 she was curetted when three months' pregnant because her doctor thought she was too weak to carry the baby. Physical examination on October 24, 1921, was negative except for a blood pressure of 140/110. On November 1, 1921, one week before term, labor was induced with a No. 5 Voorhees' bag. When the bag was out of the cervix a version and extraction was done. Duration of labor was seven hours and forty minutes. There were no lacerations. Anesthetic consisted of morphine gr. 1/6, hyoscine grs. 3/200, sodium bromide grs. 20, and chloroform for the version. The third stage was uneventful and lasted twenty minutes. After the delivery of the placenta there was a little more than the average amount of bleeding. The patient was put back to bed in good condition, but was slow in reacting. At the end of an hour B. P. was 70/50, pulse 120. Pallor was extreme. Treatment consisted of elevation of the foot of the bed and warm blankets. Recovery was uneventful. The mother and baby were discharged on the thirteenth day in good condition. I delivered this patient June 5, 1923, under morphine, hyoscine and ether anesthesia, and on March 19, 1927, under morphine, bromide, hyoscine, ether-in-oil enema and sacral anesthesia, and on May 2, 1931, I curretted her on account of an incomplete abortion under avertin anesthesia with no complications.

No. 4,797, W., F., M., aet. 28. This was the patient's fifth pregnancy and had lasted five weeks.

About ten days before I saw her she began to pass clots and to have chills and fevers. The fever persisted for several days. On March 14, 1927, nine days after her first bleeding, she began to pass clots. She was seen by her doctor the next day. He prepared to pack her. On introducing a bivalve speculum he saw some membranes protruding from the cervix. He removed them and lightly packed the vagina. The patient immediately went into extreme shock, so that her pulse could not be felt. She was given some adrenalin. Her pulse came back but was very slow. When I saw her in consultation her B. P. was 60/10. She was extremely pale. There was no external bleeding. The patient was brought into the Johnston-Willis Hospital in an ambulance between warm blankets. The hemoglobin was 60 per cent, red cells 3,400,000. B. P. was 105/60. On March 16th, the packing was removed. Red cells were 4,070,000, leucocytes were 14,800 with 60 per cent polymorphonuclear neutrophiles. On March 17th, she had severe cramps when an enema was given. She had two slight fainting spells that day. The patient was discharged from the hospital March 19th much improved. The highest temperature in the hospital was 99.6, the highest pulse rate 115.

No. 6,279, W., F., S., aet. 17, a primipara, was admitted to the Spring Street Home, March, 1929. Physical examination was a negative except for a B. P. of 145/85. With rest and regulation of her diet her blood pressure became normal, but on April 15th it rose to 155/90. The systolic pressure remained above 150 until May 9th, when the membranes ruptured. Blood pressure then was 135/80. She soon began to have almost continuous pains, and was given 1/6 gr. morphine, and 1/200 gr. of hyoscine. When the cervix was nearly fully dilated, fourteen hours after the onset of labor, the patient was given spinal anesthesia with 3/4 gr. of novocaine. The dilatation was completed manually and a version and extraction was done. The delivery was completed at 9 A. M. The estimated loss of blood was 5 ounces. No ergot or pituitrin were used. The patient was put back to bed with a B. P. of 120/80 and a pulse of 98. The baby weighed 7 lbs. 3 ozs. At 10:30 A. M., pulse was 130 and the patient was fairly comfortable. At 11 A. M., the pulse was 140 and the patient was cold and clammy. At 11:30 A. M., the nurse was unable to feel her pulse. At noon the patient vomited a large quantity of greenish fluid. B. P. was 60/?. She then began to flow freely. The nurse had already elevated the foot of the bed and applied hot water bottles. She was given gynergen, ephedrin and adrenalin and a proctoclysis of glucose solution. At 1 P. M., B. P. was 80/55 and the pulse was 135. During the night the patient was restless and talked incoherently. At 8 A. M., B. P. was 95/80. From this time the puerperium was uneventful.

No. 6,299, W., F., M., aet. 20. This patient, a primipara, was seen in consultation. Her labor lasted twelve hours. Twenty minutes before a spontaneous delivery she was given 5 minims of pituitrin. She had 1½ grs. of luminal in the first stage and ether at the delivery. There was no unusual loss of blood. The baby was born at 6 A. M. At 6:45 A. M., it was noted that the patient was very white and complained of being tired. The pulse was slow and very weak. B. P. was not taken. At 7 A. M. she had more color and her pulse was more easily felt. At 7:30 A. M., she bled freely and was given gynergen and hot coffee. At 8:30 A. M., she was feeling better, and an hour later she was in a profuse sweat. Her recovery was uneventful except that her temperature reached 100.4 on the second, third, fourth, and fifth days. She was discharged on the eighth day in good condition.

No. 7,465, W., F., M., aet. 24, primipara, consulted me April 15, 1930, just after she had missed her second period. She gave the history of having inflammatory rheumatism when twelve years of age with some heart involvement and there was still a marked systolic thrill at the apex. Her pelvis was normal. The uterus was soft and retroverted. The pregnancy continued in a perfectly normal manner. She entered the Johnston-Willis Hospital in labor September 23, 1930. The patient slept most of the night. The next morning when the cervix was nearly dilated she was given avertin (1 gr. per kilo.) and when the head was on the perineum it was lifted out with the forceps. A little ether was given at that time. The total anesthetic medication was sodium bromide grs. 10, chloral hydrate grs. 10, morphine grs. ½, hyoscine grs. 1/100, avertin, and ether. A median episiotomy was repaired with three longitudinal sutures of silk worm gut. The patient lost about 5 ounces of blood in the third stage. The total duration of labor was twenty-one

hours and thirty-seven minutes. She was put back to bed in good condition with a B. P. of 94/40. One hour and a half after delivery she went into shock. The pulse could not be felt. She responded quickly to elevation of the foot of the bed, and by the time that I could get back to the hospital she was in good condition. On the third day of the puerperium her temperature rose to 103 and her pulse to 130. The temperature gradually subsided to normal on the sixth day and remained so. Her pulse, however, remained above 100 until the day before her discharge on the eleventh day. The patient has subsequently gone through an uncomplicated labor.

No. 7,585, W., F., M., aet. 30, primipara. She consulted me July 11, 1930. She had pneumonia in 1925 and an appendectomy in 1918. Since two years of age she had been a great sufferer from asthma. Her attacks come on in the spring or when her husband's clothes smell of ether or tobacco. The patient had a miserable time during her pregnancy with faintness and nausea. The blood pressure ranged from 120 to 130 systolic and 70 to 80 diastolic. On November 29th, the B. P. rose to 149/90. Her bowels were loose and she complained of her usual nausea. The urine was free from albumen. On December 15th, B. P. was 140/90, and on December 22nd it was practically the same. On December 29th, B. P. was 150/100. She was having abdominal cramps every seven minutes. The urine was negative. On January 12, 1931, B. P. was 145/90. The patient was very uncomfortable. The cervix was effaced but not dilated. On January 17th, the patient was so uncomfortable that it was decided to induce labor. A No. 5 Voorhees' bag was introduced into the cervix under light ethylene anesthesia. The dilatation was rather slow, requiring twenty-eight hours and fifty-four minutes. During this time the patient was given 1/6 gr. of morphine, 3/200 gr. of hyoscine, 15 grs. of sodium bromide, and 15 grs. of chloral hydrate and avertin (1 gr. per kilo.). She was delivered by version and extraction under chloroform anesthesia. There were about 14 ounces of blood lost. One c.c. of pituitrin was given after the placenta was delivered. The baby measured 22.14 inches and weighed 7 lbs. 6¾ ozs. The patient was put back to bed in good condition with a B. P. of 112/78. When she awoke from her anesthetic she had an expression of abject terror. She was very restless and could not be kept still. One and a half hours after delivery the patient was cold and shivering. There was a little more than the normal amount of flow, and she was given ½ c.c. of pituitrin and a hypodermoclysis of 17 ounces of saline with 16 minims of pituitrin was started. The foot of the bed was elevated. The pulse could not be counted. Respirations were 45 per minute. An attempt was made to give glucose solution intravenously, but we could not get into a vein with a needle, and before we could cut down upon a vein and get a canula in, the patient died, three and half hours after delivery.

No. 8,045, W., F., M., aet. 23 years, primipara. She was first seen March 6, 1931, when four months' pregnant. She was recovering from a severe hyperemesis. Physical examination was negative except for a funnel pelvis; the bi-ischial diameter measuring three inches and the pubic arch 62°. The pregnancy from this time on was normal. There was a gain of 20½ lbs. in weight. The urine remained negative, and the B. P. ranged from 105/55 to 120/70. On June 30th she entered the Johnston-Willis Hospital in labor. She was given 1/6 gr. of morphine and 1/200 gr. of hyoscine and 1 grain of avertin per kilo. The patient went to sleep under this medication. When she awoke the head was out of the cervix in R. O. A. position. Under ether anesthesia forceps were applied and a slow extraction was done. A right medio-lateral episiotomy was repaired with three longitudinal sutures of silk worm gut. The estimated loss of blood was 14 ounces. The patient was put back to bed in apparently good condition. B. P., however, was 60/40. It was taken at ½ hour intervals as follows: 50/40; 78/40; 50/40; 80/40; 82/40; 70/48; 84/56; 96/52. There was no external bleeding. The treatment consisted of elevation of the foot of the bed and hypodermoclysis. The puerperium was uneventful. On July 29, 1931, the post-partum examination was normal. On June 29, 1932, she returned for a routine physical examination, which was normal. B. P. was 120/70.

No. 8,724, W., F., M., aet. 36. This patient has had twelve children and one abortion. Her eighth delivery was a forceps operation; her ninth pregnancy was terminated on account of lung trouble. Her tenth and eleven pregnancies ended in breech

XUM

extractions. Her twelfth delivery was under my care at the Sheltering Arms Hospital and was also a breech case. My post-partum notes on July 16, 1931, show the patient to be weak and nervous and suffering from constant headache; B. P. 175/100. She was apparently not giving enough milk for the baby. The patient consulted me in her thirteenth pregnancy May 29, 1932. She had at that time an accentuated second pulmonic sound and a blood pressure of 160/95. She had first felt fetal movements December 20th. The cervix was three fingers dilated. I sent her into the Sheltering Arms Hospital and ruptured the membranes at 7:45 P. M. Pains began at 9 P. M. The breech presented. At 9:54 P. M. dilatation was complete. Under ether anesthesia I disengaged the frank breech and brought down both feet and did an easy extraction. There was no new laceration, and no unusual loss of blood. After the patient was put back to bed she went into moderate shock, but recovered promptly when the foot of the bed was elevated.

On June 5, 1933, the patient entered the Sheltering Arms Hospital for a threatened abortion. On June 8th she began to flow profusely and went into shock. B. P. was 70/30, color ashy, skin moist and clammy and epigastric pain. She was given 17 ounces of saline with 16 minums of pituitrin in it by hypodermoclysis. After one and half hours the patient looked much better. She was taken to the operating room and some placental tissue removed with sponge forceps and the uterus was lightly curetted. The patient left the hospital July 15th in good condition except for pallor.

No. 8,759, W., F., M., aet. 35, III-para, seen in consultation June 7, 1932. The patient had had a spontaneous delivery under ether anesthesia after a labor of four hours and fifty minutes. There was a first degree laceration. Estimated loss of blood was 10 ounces. After she was put back to bed she went into shock. Her systolic pressure went below 90. Her color was ashen and she began to flow rather freely. The foot of the bed was elevated and 1/30 gr. of strychnine was given. Her color promptly began to improve, B. P. rose to 124/75 and the flow checked. Puerperium was normal.

No. 8,928, W., F., M., aet. 31, was seen in consultation October 6, 1932. Her story was that she was about two months pregnant. She had four children and previous abortion. She had had a woman inject some water into her uterus several times. The last time was on October 4th. On October 6th she began to bleed a little but had no pains. She was seen by her doctor who found about a quart of blood and urine in a vessel. He was unable to say how much was blood and how much was urine, but thought that most of it was urine. Shortly after his visit the patient became faint. He again saw the patient and found her in shock. I saw her about one-half hour later. The foot of the bed was elevated. The patient was apparently bloodless. There was no external bleeding. Pulse was slow and thready. B. P. 62/40. The patient complained of no pain. The hot water bottles, blankets and elevation of the foot of the bed were continued. The patient was given 1/20 gr. of strychnine every three hours. She slowly revived and in ten hours she was definitely out of shock.

No. 9,024, W., F., M., aet. 36, primipara, consulted me November 2, 1932, when she was two months pregnant. Twelve years previously she had a D. and C. and radium for dysmenorrhoea. Otherwise her history is unimportant. Her pelvis was normal. B. P. 120/80. Urine showed a trace of sugar. Except for considerable nausea, her pregnancy was uneventful. No sugar was found in the urine after her first visit. On May 13, 1933, she entered the Johnston-Willis Hospital because her membranes had ruptured. Pains started two hours later. When the head was on the perineum and had rotated anteriorly, I did a low forceps operation after a lateral episiotomy. Duration of labor was six hours and five minutes. Anesthetic consisted of sodium amytal 12 grs., hyoscine 1/100 gr., and light ether. Estimated loss of blood was 7 ounces. When she was put back to bed it was noticed that she was limp and pale. B. P. was 100/70. (It was 135/85 on admission to the hospital.) She became very restless and bled perhaps 7 ounces. B. P. dropped to 70. Pulse and respiration were rapid. Treatment consisted of elevation of the foot of the bed, hypodermoclysis with normal salt solution and pituitrin, and 1/30 gr. of strychnine, hypodermically. Recovery was prompt. Puerperium was normal and the patient left the hospital on the eleventh day in excellent condition.

No. 9,872, W., F., M., aet. 39. Patient consulted me January 17, 1934, early in her sixth preg-

nancy. Her fourth pregnancy ended in a miscarriage at six months due to a severe toxemia. Examination showed a soft anteflexed uterus the size of a two months pregnancy. She was quite miserable, slept poorly, and was extremely nauseated. In spite of home treatment consisting of rest and sedatives per rectum, she continued to vomit. On March 12th she was vomiting blood. Her urine was normal. B. P. was 130/80. Nevertheless, she looked badly and it was decided to interrupt her pregnancy. Six drams of Leunbach's paste were injected into the uterus at 11 A. M. She began to have pains at 11 P. M., and towards morning she began to bleed rather freely and entered the hospital at 5 A. M. B. P. was 105/70. There was no bleeding after admission, but her pains continued. She was given 1/3 gr. of morphine, 1/100 gr. of hyoscine, and ether-in-oil enema. At 8:30 A. M. she woke up from the rectal ether in shock. B. P. could not be taken nor could her pulse be felt. She complained bitterly of abdominal pain. She was given 32 ounces of 5 per cent glucose solution intravenously, strychnine 1/30 gr., and a hypodermoclysis with normal salt solution was started. The patient soon went back to sleep and the pulse returned at the wrist. At noon a mass was seen at the vulva and was expressed by pressure upon the uterus. This consisted of a female fetus 15 cm. long, and a rolled up placenta. About 10:30 P. M. the patient began to have an almost continuous diarrhoea and at 11:30 P. M. she again went into shock. Her pulse could not be felt. There was no bleeding. She was given 1/30 gr. of strychnine and 4 grs. of caffeine sodium benzoate. She recovered promptly and was discharged in good condition on the fifth day.

No. 10,263, W., F., S., aet. 25, II-para, was admitted to Brookfield December 8, 1933. Physical examination was negative except for an old laceration of the perineum. On January 1st, B. P. rose to 155/90. The diet was restricted and she was given Epsom salts. On January 8th, B. P. was 115/80, but on the fifteenth it was 145/100. She was again purged with Epsom salts. On January 22nd and 29th, B. P. was 135/80. She was given 1½ ozs. of castor oil and 5 grs. of quinine. Her membranes ruptured spontaneously one and one-half hours later and she began having pains. She was given 7 grs. of sodium alurate. When the cervix was fully dilated, 3/4 grain of novocaine dissolved in spinal fluid was given intrathecally. By this time the head presented at the vulva in L. O. A. position and was lifted out with the forceps. A small first degree laceration was repaired. The placenta was delivered seven minutes later. Estimated loss of blood was 5 ounces. Total duration of labor was two hours and twenty-seven minutes. The baby, a male, weighed 6¼ lbs. The placenta contained six large infarcts. The patient was put back to bed in good condition with a B. P. of 155/100. An hour and thirty-three minutes after delivery the patient complained of abdominal pain and went into shock. The nurse was unable to feel the radial pulse for thirty minutes. She elevated the foot of the bed. I saw the patient fifty minutes after she went into shock. B. P. was then 100/85. Her color, or rather lack of color, had a greenish tinge. The uterus was firm and well contracted. There was no external bleeding. The abdomen was sunken and not tender. She was given 1/30 gr. of strychnine every hour for three hours. At the end of that time she was nauseated, but her blood pressure was rising. The puerperium was uneventful.

No. 10,301, W., F., M., aet. 40, consulted me August 2, 1934. She had five children, two of which were twins. There had been no miscarriages. At the birth of her twins she had puerperal fever and was in bed a month. I delivered her of her fourth child October 15, 1923, and her fifth June 3, 1927. These births were uncomplicated. At her post-partum examination July 6, 1927, it was noted that she had sibilant rales over the upper right back, that the liver was moderately enlarged, and that her B. P. was 130/90. When she consulted me August 2, 1934, her B. P. was 150/95, the cervix was two fingers dilated, and the fetus was in R. O. P. position. She was sent to the Johnston-Willis Hospital and was given 1 oz. castor oil and 5 grs. of quinine. The membranes were ruptured at 3:14 P. M. When the head was out of the cervix and had rotated anteriorly, forceps were slipped on and an easy extraction was done. There was no laceration. Total duration of labor was two hours and twenty-six minutes. Estimated loss of blood was 7 ounces. Her blood pressure after she was put back to bed was 110/80. One hour and a half later her blood pressure dropped to 90 systolic. She was pale and began to bleed rather freely. The

foot of the bed was elevated and she was given 1/30 gr. of strychnine. Fifteen minutes later the systolic pressure was 120 and there was no further bleeding. Her recovery was uneventful.

trin. There were five low forceps operations, one breech extraction and three versions and extractions. One of the versions was preceded by completing the dilatation manually, and two were preceded by

CASE NO.	AGE	CH.	ABS.	WASS.	B. P.	OPERATION	DURATION	ANESTHETIC	REMARKS	DIATHESIS
1776	40	5	2	0	.....	Incomplete abortion.	.....	None	.....	Stout, Apoplectic
2161	23	0	1	0	140/110	Bag and version.....	8	Morph. Hyos. Na Br. Chloroform.....	.....	Frail
4797	28	4	0	.....	.....	Incomplete abortion.	.....	None.		
6279	17	0	0	0	155/90	Dry labor, manual dilatation, version.	14	Morph. Hyos. Spinal.		
6299	20	....	0	0	.....	Pituitrin and spontaneous	12	Luminal, Ether.		
7465	24	0	0	0	120/80	Low forceps.....	22	B and C, Hyos. Avertin Ether.....	.....	Rheumatic.
7585f	30	0	0	0	150/100	Bag and version.....	28	Morph. Hyos. Avertin Chlor.....	Hyperemesis..	Asthmatic.
8045	23	0	0	0	120/70	Low forceps.....	10	Morph. Hyos. Avertin Ether.....	Hyperemesis.	
8724	36	12	1	0	160/95	Rupture membranes, Breech extraction.	2	Ether.....	.....	Nephritic.
8759	35	2	0	.....	.....	Spontaneous.....	5	Ether.		
8928	31	4	1	.....	.....	Abortion.....	.....	None.		
9024	36	0	0	0	135/85	Dry labor, low forceps.....	6	Sodium amytal, Hyos. Ether.	Hyperemesis..	Frail.
9872	39	4	1	0	130/80	Leunbach paste.....	.....	Morph. Hyos. Ether-enema.....	Hyperemesis Diarrhoea.	Frail.
10263	25	1	0	0	155/90	Dry labor, low forceps	2	Sodium alurate, Spinal.		
10301	40	5	0	0	150/95	Rupture membranes, Low forceps.....	2	Sodium amytal, Hyos. Ether.		

DISCUSSION

All my patients were white women. Their ages varied from seventeen years to forty years, the average being 29.8. Two were unmarried. Seven were primiparae if you count one who had had a previous therapeutic curettement at two months as a primipara. One had one child, one had two children, three had four children, two had five, and one had twelve. All patients except those seen in consultation had negative Wassermann reactions. The blood pressure in the majority was somewhat above normal, but in none was it extremely high. Albuminuria was usually absent. The kind of delivery was various. Four cases were abortions, and eleven was full-term deliveries. One of the abortions was induced by injecting Leunbach's paste, one was caused by a fall, and two were induced by abortionists. Of the full-term deliveries, five were dry labors, including two cases in which labor was induced by rupturing the membranes. One delivery was unaided, one was spontaneous plus pituiVoorhees' bags. The anesthetic varied as much as the operations. Three patients had no anesthetic. Two had only ether. One had ether preceded by luminal; one ether preceded by bromide, chloral, and avertin; one ether preceded by morphine, hyoscine, and avertin; one ether preceded by morphine and hyoscine alone, and another by sodium amytal and hyoscine. Two had chloroform anesthesia preceded by morphine, hyoscine, and sodium bromide, in one, and by morphine, hyoscine and avertin in the other. There were two spinal anesthesias. Three-fourths of a grain of novocaine was used in each. In one the spinal puncture was preceded by morphine and hyoscine, and in the other by sodium alurate.

Three patients had pronounced hyperemesis in early pregnancy. One had diarrhoea after the shock. It is interesting to note that I have in the hospital now a patient who had shock from ablatio placentae and severe hemorrhage, who had a severe diarrhoea for thirty-six hours afterwards. In looking back over these cases, I am impressed by the number that

complained of abdominal pain and restlessness, although the notes do not always mention it.

Polak, in discussing Randall's paper, said that his worse cases of shock without hemorrhage occurred in blue-eyed doctor's wives. Two of my patients were doctor's wives, but I do not believe that their eyes were blue. Two patients were frail and asthenic, and one was stout and of an apoplectic diathesis. She later had a cerebral accident. One patient was nephritic, and one had had rheumatism and heart disease. One patient, the only fatal case, had severe asthma. Unfortunately, there was no autopsy, and so it is possible that she does not belong in this group.

These fifteen cases of shock severe enough to cause alarm, and in which hemorrhage did not seem to play an etiological role, occurred in 7,177 cases of abortions and full-term labors of which I have notes. This would make the incidence slightly more than 0.2 per cent. In fourteen of my cases recovery rules out ruptured viscera and other severe abdominal lesions that are found so often in cases of so-called obstetrical shock that come to autopsy.

A great many causes have been advanced to account for obstetrical shock: bruised tissue, chemical changes in extravasated blood, sudden release of abdominal tension, a combination of fear and anxiety with pain leading to a state of mental and physical exhaustion and eventually to shock, presence of an anesthetic, degeneration of the liver, loss of body fluids, and acidosis. Many of these "causes" are present in every labor, and, if they be true causes, the difficulty arises in explaining the *infrequency* of obstetrical shock.

In this connection, Dr. Byrd,[12] a former interne at the Johnston-Willis Hospital, is reporting a very interesting case. His case was that of shock with, in addition, a generalized urticaria and edema of the face that came on just after a post-partum injection of pituitrin. The patient was later given an intra-dermal test, and re-acted with a solution of 1-100 of pituitrin.

There is one possible cause that I have not seen advanced, and that is the spill of blood or fluid into the peritoneal cavity through the fallopian tubes. Goodall has shown that occasionally the tubes are preternaturally patent, and it is possible that occasionally fluid that was present in the uterus might regurgitate into the peritoneal cavity in sufficient quantity to cause shock. The fact that in three of my cases fluid had been injected into the uterus lends color to this idea.

Under the head of treatment I wish to emphasize the early recognition of the condition. In some of my cases at least, the pallor preceded the fall in blood pressure. When, after delivery, the patient is unusually pale or the blood pressure begins to fall, the foot of the bed should be elevated and fluid should be given under the skin. By such treatment, I believe shock may be prevented, or, if it does occur, its duration can be shortened. Theoretically, fluid in the blood vessels is the ideal treatment, and for this purpose a 6 per cent gum acacia solution is highly recommended. Of drugs, strychnine has seemed to me to be distinctly worth while.

CONCLUSIONS

Shock without obvious cause may occur in 0.2 per cent of labors and abortions.

Patients with unusual pallor after delivery or a falling blood pressure should be treated as though they were in shock in hopes of aborting or shortening an attack.

REFERENCES

1. Blalock, Alfred: *Surg., Gynec. and Obst.*, 58:551, 1934.
2. Cannon, W. B.: Traumatic Shock. New York. D. Appleton & Co., 1923.
3. Crile, G. W.: An Experimental Research Into Surgical Shock. Philadelphia, J. B. Lippincott Co., 1897.
4. Erlanger, J., Gesell, R., and Gasser, H. S.: *Am. J. Physiol.*, 49:90, 1919.
5. Freeman, N. E.: *Am. J. Physiol.*, 103:185, 1933; 104, 628, 1933.
6. Goodall, J. R.: *J. Obst. and Gynec. Brit. Emp.*, 41:78, 1934.
7. Mann, F. C.: *J. A. M. A.*, 69:371, 1917.
8. Mitchell, Weir: Injuries of Nerves and their Consequences. Phila., J. B. Lippincott Co., 1872.
9. Paré, Ambroise: *Les Oeuvres.* 12 ed., p. 208. Lyon, 1664, cited by Blalock.
10. Warren, John Collins: *Surgery, Pathology and Therapeutics.* Phila., W. B. Saunders Co., 1900, cited by Blalock.
11. Wehrung, E., and Nerson, H.: *Bull. de la Soc. d'Obst. et de Gynec.*, 23, 430, 1934.
12. Byrd, H. G.: *Va. Med. Mo.*, 61:993, 1935.

Medical Arts Building.

XUM

THE SIGNIFICANCE OF THE COOPERATIVE CLINICAL STUDIES IN THE TREATMENT OF SYPHILIS.*

R. A. VONDERLEHR, M. D.,
Washington, D. C.
Passed Assistant Surgeon, United States Public Health Service

A study of the various problems which relate to the treatment of syphilis was planned in 1927 by the Health Organization of the League of Nations. Five American clinics† have cooperated in this investigation. Believing that their clinical material provided information on many points not emphasized by the studoy and desiring to extend the investigation to various forms of late as well as early syphilis, the five chief clinicians organized a cooperative clinical group whose function it was to conduct a retrospective inquiry into the results of treatment in the several stages of syphilis. The cooperation of the United States Public Health Service with its coordinating and statistical facilities was enlisted. The cost of these studies was considerable and was borne, first, by a grant obtained from an anonymous donor; later by a large philanthropic organization, and within the past year the United States Public Health Service has assumed the entire burden. Such support has made it possible for the United States to conduct an independent evaluation of the treatment of syphilis in its representative clinics and, in addition, extend the desired cooperation to the League of Nations.

The American study had as its aim the analysis, interpretation, and evaluation of pooled records from the five syphilis clinics. The intention has been to utilize the results of this composite experience to simplify and standardize methods and practice in the treatment of syphilis for the information of the specialist and the guidance of the physician in general practice. Aside from the greater value resulting from the fusion of the records, it has been possible to reflect in these studies the opinion and experience of the participating clinicians.

The accumulated clinical material of these five clinics approximated 75,000 records of patients treated for syphilis. Uniformity of selection of cases has prevailed. The extent of this selection will be stated later in a brief description of the findings from the various studies. Several articles based on these cases have been published. These relate to the treatment of early syphilis, the problem of mucosal and cutaneous relapse, the treatment of latent syphilis, the effects of syphilis in pregnancy, and the reactions of the human body to the arsenical compounds administered in the treatment of this devastating disease. Additional articles are now in process of preparation on the treatment of cardiovascular syphilis. Plans for an analysis of the results of the treatment of syphilis of the central nervous system and also of pre-natal syphilis are under way. With the material available every important aspect of syphilis will be covered.

The primary purpose of this paper, therefore, is to summarize and to present briefly the most important findings which have resulted from the collective studies that have thus far been completed.

EARLY SYPHILIS

The studies in early syphilis give the most hopeful indication for the eradication of syphilis as a community problem. The prevention of the spread of infection by treatment has been reemphasized in the cooperative clinical studies, and a standard plan of therapeutic procedure evolved which insured favorable results.[1]

The need for a system for the appplication of antisyphilitic remedies, which will insure the best results and possibly ultimate cure, has long been felt.

The cooperative clinical studies have demonstrated that the most satisfactory treatment of early syphilis must be *continuous*; it must employ an arsphenamine and bismuth; it must call for not less than

*Read before the Ex-Internes Association, Stuart Circle Hospital, Richmond, Va., April 10, 1935.

†The American clinics selected were the Johns Hopkins University Clinic, headed by Dr. Joseph Earle Moore; the Mayo Clinic, by Dr. Paul A. O'Leary; The University of Michigan, by Dr. Udo J. Wile; the University of Pennsylvania, by Dr. John H. Stokes, and the Western Reserve University Clinic, by Dr. H. N. Cole. The cooperation of the U. S. Public Health Service was sought in the administrative management of the studies and for its statistical facilities.

twenty, and unless special resistiveness is encountered, hardly more than 30 injections of the arsphenamine; and the system should call for continued treatment with heavy metal for one year after all symptoms and signs of the disease have disappeared. Blood tests should be taken at least at the beginning and end of each arsphenamine course and the patient should be warned, before treatment is instituted, of the lack of significance of the negative report from the standpoint of the schedule. The

TABLE 1—A SCHEME OF TREATMENT FOR EARLY SYPHILIS*

Day or week	Arsphenamine	Interim treatment	Blood Wassermann reaction	Remarks
Day				
1	0.3-0.6		1	Arsphenamine dosage for first 3 injections at level of 0.1 gram for each 25 pounds body weight. Average subsequent dosage, 0.4 gram, men, 0.3 gram, women. In average patient all lesions heal rapidly and blood Wassermann reaction becomes negative during first course. If arsphenamine cannot be used, substitute 8 to 10 doses 0.3 gram silver arsphenamine, or 10 to 12 doses 0.6 gram neoarsphenamine. This applies also to subsequent courses.
5	.3-0.6			
10	.3-0.6			
Week				
3	.4			
4	.4			
5	.4			
6	.4			
7	.4		1	If mercury is used, note overlap of 1 week at end of first and start of second arsphenamine courses. At this point a few days without treatment may be dangerous. Neurorecurrence.
8		Bismuth, 4 doses, 0.2 gram and K. I., or Ung. Hg. and K. I.		
9				
10				
11				
12	.4		1	Arsphenamine starts, bismuth stops. Watch for provocative Wassermann reaction after first dose of arsphenamine.
13	.4		1	
14	.4			Try to prevent short lapses in treatment, especially at this early stage.
15	.4			
16	.4			
17	.4		1	
18-23		Bismuth, 6 doses, or Ung. Hg. and K. I.		Bismuth is better than mercury. Use it if possible. Examine cerebrospinal fluid if patient's cooperation can be secured at about this time.
24	.4			
25	.4			
26	.4			
27	.4			
28	.4			
29	.4			
30-37		Bismuth, 8 doses, or Hg. and K. I.		
38	.4		1	
39	.4			
40	.4			
41	.4			
42	.4			
43	.4		1	Patients with seronegative primary syphilis may cease treatment here, if blood Wassermann reaction has always been negative.
44-53		Bismuth, 10 doses, or Ung. Hg. and K. I.		Note that bismuth or mercury courses are gradually getting longer—4, 6, 8, and now 10 weeks.
54	.4		1	
55	.4			The average seropositive primary or early secondary patient should have at least 5 courses of arsphenamine.
56	.4			
57	.4			
58	.4			
59	.4		1	
60-69		Bismuth, 10 doses, or Ung. Hg. and K. I.		It is safer to finish treatment with bismuth or mercury rather than with arsphenamine.
70-122	Probation	No treatment	6-12	Blood Wassermann every month if possible; at least every other month.
123	Complete physical and neurologic examination, spinal puncture, and, if possible, fluoroscopic examination of cardiovascular stripe. Thereafter, yearly physical examinations, blood Wassermann every 6 to 12 months. If the 2 spinal fluid examinations above are negative, this need not be repeated.			

*From Ven. Dis. Inform., Apr., 1934, 15: 159.

reappearance of weak positives, after negative reactions have appeared, should be taken as seriously as strong or fully relapsing positives. A spinal fluid examination, including serologic tests for syphilis, cell count, protein estimation, and colloidal gold test should be made before the end of the arsphenamine phase of treatment, or before the introduction of any rest period (none should be allowed until after the first year). It is understood that such a system can be carried through only with adequate tolerance on the part of the patient, and this tolerance should be conserved in every possible way. The same system should be employed whether treatment is begun in the sero-negative or sero-positive primary stage, or in the secondary stage.

An analysis was made of 3,244 cases of early syphilis under observation for a period of six months or more.[2] It was found that eight out of every ten of these patients who had a communicable form of relapse had received less than fifteen doses of arsphenamine with the accompanying heavy metal. Thirty-five per cent of such relapsed patients had received less than five doses of arsphenamine. Additional factors demonstrated that the critical time for treatment of the syphilitic patient was in the first two years of the disease. During the first six months after treatment ceases, 45 per cent of the infectious relapses had occurred; by the end of the first year, 73.6 per cent; and by the end of the second year, 91 per cent.

Authorities have divergent opinions as to the time during the early syphilitic infection when treatment should be started. The development of a generalized immunity to the Spirochaeta pallida in the secondary stage is well known. Some workers believe that treatment should not be commenced until an opportunity has been given to the patient for the development of this immunity. In other words, when a patient presents himself in the primary stage, especially after a positive serologic blood test has developed, the attending physician gives no immediate treatment but waits for the secondary stage.

A study of the stage of the disease at which the patient began treatment yet subsequently developed an infectious relapse presented a possible solution of this question. It was found that among the sero-negative primary cases 16 per cent showed evidence of infectious relapses, 20 per cent among the sero-positive primary cases, and 9.5 per cent among those patients who began their treatment in the secondary stage of syphilis. It is especially to be noted, however, that the patients who began treatment in the secondary stage of the disease had already passed through a communicable period in the chronology of the disease (the primary stage). During their primary stage 100 per cent of the cases had already been infectious. The final incidence of communicability for those beginning treatment in the secondary stage may, therefore, be set at 109.5 per cent (100 per cent plus 9.5 per cent), and appears to be of much more significance than the relapses in those patients beginning treatment in the primary stage with negative or positive serologic blood reactions.

The significance of changes in the serologic reaction of the blood in syphilis has long been under investigation by both syphilologists and serologists. In the cooperative clinical studies the failure of the blood serologic reaction to reverse usually manifested itself in the coexistence of communicable relapse in a higher percentage than when the reaction reversed. Under continuous treatment only 2.5 per cent of the patients whose serologic reactions became negative within the first year of the disease developed a muco-cutaneous relapse. This compared with 6.7 per cent of those similarly treated whose reaction failed to reverse within the first year. A similar phenomenon was noted with each of the other types of treatment; intermittent 8.2 per cent and 15.9 per cent; irregular 12.8 per cent and 42.2 per cent.

It was established that the failure of serologic tests of the blood to reverse was more a matter of how treatment was given than of how much. The regular administration of arsphenamine and heavy metal, especially in the first three months of the disease, caused the greatest number of serologic reversals; even a little treatment given continuously was found to be more than twice as effective as when it was given intermittently.

How long and in what manner should treatment be given in order to attain best results from the standpoint of the patient? For the prevention of the late and crippling manifestations of syphilis the advantage of adequate treatment, that is more than twenty doses of arsphenamine, as compared with inadequate treatment, is evident. There were three times as many individuals who developed some type of central nervous system involvement among those who had received less than twenty doses of arsphe-

namine with its accompanying heavy metal than among those receiving more than this amount. The effectiveness of treatment was not noted to the same extent in syphilis of the heart and blood vessels—0.9 per cent adequately and 1.2 per cent inadequately treated. There appeared to be no indication that the stage of early syphilis at which the patient began treatment tended to influence the development of a cardiovascular or central nervous system involvement.

An effort was made to determine the probability of progression after the patient had remained under treatment for a two-year period or more. For this reason the discussion of early syphilis will subsequently be limited to the end-results in such cases. It was found that with a continuous scheme of treatment in which an arsphenamine with accompanying heavy metal was used, if the patient began treatment in the sero-negative primary stage, 86.4 per cent satisfactory results* were attained. But when the same scheme of treatment was used in the early secondary stage, the good results dropped slightly to 81.5 per cent. It is of interest to note that the most effective scheme of treatment in the sero-positive primary stage was an intermittent scheme (64 per cent satisfactory results by continuous and 70 per cent by intermittent treatment). This may have been due to the fact that these patients gained an immunity in the interim when no treatment was given. Such a hypothesis would coincide with the theory of the development of immunity when treatment is not given until the secondary stage has been reached. In any event, it is important to note that the occurrence of communicable manifestations of syphilis is obviated in the sero-positive primary stage by the intermittent system.

From these data it would at first seem advantageous to the patient to delay treatment until he arrives at the early secondary stage. When all types of relapse are reviewed, however, it is found that, aside from the increased number of infectious relapses, there is no evidence that beginning treatment at any time in the primary stage predisposes the patient to late and crippling manifestations of syphilis. With persistence in treatment any patient with primary syphilis may expect as satisfactory an outcome as is attained by those individuals who wait until the secondary manifestations of syphilis have developed. From a public health standpoint, the grave epidemiologic consequences of delayed treatment have already been discussed and are obvious. The cooperative clinical group recommend, therefore, that treatment of early syphilis be instituted as soon as possible after the appearance of the chancre.

*"Satisfactory result" implies that the patient has been followed for two years or more and that during one probationary year he has had no symptoms of syphilis, his blood has been consistently negative, he has had a negative physical examination and in almost all instances a negative spinal fluid examination, or he has had a reinfection.

SYPHILIS IN PREGNANCY

The findings having the next greatest public health significance relate to those in which the disease coexisted with pregnancy. The cooperative clinical studies included the records of 3,817 syphilitic women under treatment.[3] Among these, 603 were pregnant during or after antisyphilitic therapy. These 603 women experienced 922 pregnancies and the results of 607 pregnancies were known. They indicate that with early and adequate treatment during pregnancy the prognosis is most favorable for the birth of an infant apparently free from syphilis. Unfortunately, there are as yet no records available relative to the development of syphilis in the child subsequent to birth. When treatment of the syphilitic mother was adequate, that is, consisted of ten or more injections of one of the arsenical compounds and accompanying heavy metals, and the administration was begun before the fifth month of pregnancy, 91 per cent of all children delivered were apparently non-syphilitic. But, if treatment was delayed until after the fifth month, only 62 per cent of the children were born alive and non-syphilitic, although the maximum amount of treatment possible in the remaining gestation period had been given.

Treatment even in a previous pregnancy seemed to influence favorably the outcome of subsequent pregnancies. Thus, if treatment had been given in previous pregnancies and not in the last, an apparently healthy child was delivered in the last pregnancy in almost two-thirds of the women having a negative serologic blood reaction. But if treatment had never been received for syphilis and the blood reaction was negative, only a little more than one-fourth of the women were delivered of apparently non-syphilitic children. The cooperative clinical group, therefore, concludes that the

XUM

syphilitic mother should be given early and adequate treatment throughout every pregnancy whether her serologic test for syphilis gives a positive or negative reaction. One of the most encouraging findings in the study was that women, who had previously had two or three abortions and subsequently received antisyphilitic treatment of any kind, were able to bear living children three out of four times.

A point of additional interest was that the pregnant syphilitic woman was demonstrated to be a good risk for arsenical therapy. She tolerated the arsenicals better than the non-pregnant woman. The findings gave evidence that crustaceous dermatitis and icterus were more common in the syphilitic woman never pregnant. Such severe reactions as aplastic anemia, purpura hemorrhagica, and death due to treatment were not reported in the pregnant women undergoing treatment.

LATENT SYPHILIS

The fact that the average latent case of syphilis has passed the second year of the disease, and that syphilis in this stage does not ordinarily occur in a communicable form, makes a consideration of latent syphilis of less significance for the health officer than for the physician in private practice. The possible prevention of the transmission of syphilis by a latent syphilitic pregnant woman to her offspring offers the most important public health aspect of this stage of the disease. The infectiousness of the semen of the latent syphilitic male appears to be relatively of less importance though at the present time the degree of such infectiousness is not certainly known. On the other hand, the studies under consideration[1] offer some encouragement to the patient with latent syphilis, and resulted in the accumulation of information pertaining to the complex problem of treatment which should be of great value to the practicing physician.

The aim of treatment in latent syphilis is to decrease the probability of clinical progression or relapse in comparison with the results attained when no treatment is given, and to increase the probability of arrest. In addition, treatment should be directed toward the control of the potential infectiousness of a latent syphilitic. A rational outline for the treatment of latent syphilis, capable of application to the average patient, is shown in Table 2.

On completion of the treatment the patient should be followed with periodic physical and laboratory examinations annually for the remainder of his life. The application of this treatment method is materially influenced by the patient's age and probable life expectancy.

TABLE 2—SUGGESTED OUTLINE OF TREATMENT FOR LATENT SYPHILIS.*

1. Complete and thorough physical examination.
2. Routine test of spinal fluid before starting treatment, or as soon thereafter as possible.
3. If early latency (less than 4 years' duration) use outline of treatment for early syphilis. *Treatment must be continuous.*
4. If late latency:

Weeks 1- 7	8 weekly doses neoarsphenamine 0.45-0.6 gm.
8-17	8-10 weekly doses bismuth.†
18-25	8 weekly doses neoarsphenamine.
26-37	12 weekly doses bismuth.
38-45	8 weekly doses neoarsphenamine.
46-57	12 weekly doses bismuth.
58-69	Rest period.
70-81	12 weekly doses bismuth.
82-93	Rest period.
94-105	12 weekly doses bismuth.

Among those patients with latent syphilis treated for from two to five years, ultimate satisfactory results were attained in 46 per cent; from five to ten years in 60.6 per cent; and, among those patients who were followed for ten years or more, satisfactory results gained the prominence of 85 per cent with only 2.5 per cent of such patients experiencing a clinical relapse. In patients followed for ten or more years it was notable that serologic fastness of the blood to a large extent disappeared.

An estimate by the attending physician as to the frequency with which the patient may develop the late and crippling manifestations of syphilis is a problem of first importance to both these individuals. Of the total group of 1,936 patients, there were ninety-four who experienced some form of relapse—sixteen had an early infectious relapse, thirty-one syphilitic complications involving the heart and blood vessels, and thirty a central nervous system relapse. In five cases there was visceral involvement, usually of the liver. Of the ninety-four patients who had a clinical relapse, an ultimate satisfactory result was subsequently achieved in twenty of them. In only eight of the thirty relapsed cases with central nervous system involvement was enough damage done to cause distressing manifestations. In

*From Modern Treatment of Syphilis, by Joseph Earle Moore. Charles C. Thomas, Baltimore, 1933, p. 246.

†For purposes of this course of therapy, by the word bismuth is understood a bismuth preparation, either liposoluble or an oil suspension, that is capable of furnishing at least 80 to 100 mg. of metallic bismuth at a weekly dose.

only seven of the thirty-one cases with a relapse involving the heart and blood vessels did the condition develop into an incapacitating one during the period covered. Clinical relapse was found to be only slightly more frequent in patients with persistently positive blood reactions than in patients whose reactions had become negative. The latent syphilitic patient, therefore, is in no special danger because of the persistence of a positive blood reaction. On the other hand, the occurrence of serologic relapse of the blood frequently was demonstrated to be an unfavorable omen. The repeated occurrence of one plus or two plus reactions interspersed with groups of negatives, when the tests were frequently performed, was proven to be an especially unfavorable sign pointing to ultimate complete relapse.

All except three of the patients who had an infectious relapse began treatment in early latency, that is, syphilis of less than four years duration. Three-fourths of the cases having a relapse of any kind received less than twenty doses of arsphenamine in combination with heavy metal.

But, again, it was found that syphilis of the heart and blood vessels was not apparently affected by an increased amount of arsphenamine.

Reactions to the Arsenic Compounds

The considerable number of records accumulated made it possible to study severe reactions to the arsenicals on a large and comprehensive scale. Such reactions are of vital importance in the program for the eradication of syphilis. It is a well-known fact that these reactions and the pain associated with intravenous and intramuscular injections cause great aversion to antisyphilitic therapy in the less phlegmatic patients, and, indirectly, lapses from treatment. The study of the cooperative clinical group on arsenical reactions included a consideration of 177,360 injections. Among this number two severe reactions and thirteen mild reactions occurred per 1,000 injections. The severe reactions in their order of frequency were icterus, crustaceous dermatitis, ocular damage (found exclusively among 19,964 injections of tryparsamide), purpura hemorrhagica, and in a few instances arsenical stomatitis, aplastic anemia, hepatitis, and encephalitis.

Arsphenamine (606) and neoarsphenamine showed an equally low toxicity. Sulpharsphenamine was about 50 per cent more toxic than arsphenamine and neoarsphenamine. Although mild reactions after sulpharsphenamine were less frequent, the number of severe reactions from this drug indicated that it was the cause of much more serious damage than either arsphenamine or neoarsphenamine. Silver arsphenamine was less toxic than arsphenamine and neoarsphenamine but it was also less effective in producing satisfactory end-results. Reactions of either a mild or severe type occurred with greatest frequency during the first course of treatment. Severe reactions, especially crustaceous dermatitis and icterus, were more common among patients in the advanced age groups, while the mild reactions occurred more frequently in the early years of life.

Three-fourths of the patients in whom arsenical treatment was resumed after the first reaction experienced no further difficulty. The best measures found for the prevention of reactions were, in order of success, the postponement of arsenical treatment for at least one month and preferably for from three to six months, changing the variety of the arsenical drug, and finally lowering the dose.

The Results and Their Application

The findings made by the cooperative clinical group should, when applied, assume an important place in the solution of the syphilis problem. Under present medical organization in the United States the practicing physician holds the most prominent position in the program for the ultimate eradication of syphilis. The results of these studies have been well distributed among the members of the medical profession. The widespread prevalence of syphilis and the large number of cases in any community make it economically impossible for health organizations with present appropriations to give the consideration to the problem which is commensurate with its size.

The studies are not only of interest to the physician engaged in private practice. They are likewise of inestimable value to the health officer in whose hands is placed informative material for physicians regarding the most modern and authoritative procedures in syphilis therapy. Indeed, if all of the information uncovered were applied, the syphilis problem would soon be solved. Impediments in the way of the application of the findings are those which so frequently interfere with measures directed against this disease. Foremost among these are the high costs of an intelligent pro-

XUM

gram against syphilis, rendering present penuriously financed measures ineffective, and the indifference with which the average infected person regards the disease. To a more limited degree may also be included the neglect of many physicians to keep well informed on the subject and to adopt new methods, the apathetic and disinterested regard of the problem by most health officers, and the opprobrium and disrepute for people who contract syphilis, fortunately now somewhat decreasing but formerly strongly entrenched in the public mind.

BIBLIOGRAPHY

1. Stokes, *et al.* Ven. Dis. Inform., Washington, 19..., XV, 149.
2. Stokes, *et al.* Ven. Dis. Inform., Washington, 193..., XIII, 135, 165, 207, 253.
3. Cole, *et al.* Ven. Dis. Inform., Washington, 193..., XV, 83.
4. Moore, *et. al.* Ven. Dis. Inform, Washington, 193..., XIII, 317, 351, 371, 389, 407. 1933, XIV, 1.
5. Cole, *et al.* Ven. Dis. Inform., Washington, 193..., XIV, 173.

CARCINOGENESIS—A LINE OF RESEARCH. SECOND PAPER.
The Role of the Lymphatic System in Its Relation to Karyokinesis.*

MOSES BENMOSCHE, M. D.,
and
JAMES COULL, PH.D.,
New York, N. Y.

In a recent paper by one of us,[1] the various factors contributing to carcinogenesis were discussed and a general theory outlined. The results of electromotive force measurements on salt solutions of radioactive and non-radioactive electrolytes, reported in the same paper, led us to believe that a Helmholtz double layer, formed at the surface of the electrodes, was responsible for the galvanometric deflections produced. These potentials applied to the cell, as has been shown by Abramson,[2] are important factors in health and disease.

In the present paper we are concerned with the importance of the lymphatic circulation; particularly in regard to the part it plays in cellular stability, normal regenerative processes, as well as in cellular hyperplasia.

RADIATION THEORY OF CELLULAR DIVISION

We believe the stimulus to cellular division is due to weak radiations of low energy density from the element potassium or, more exactly, its isotope K_{41}. It has been shown by means of the mass spectrograph that two isotopes of potassium exist.[3] The quantity of isotope K_{41} in potassium from all sources has been found to be 4.8 per cent. Biltz Ziegart and others[4] have shown that the radioactivity is present in isotope K_{41}. This has been shown by measuring radiations before and after concentration of the 41 isotope, the increased radiation corresponding almost exactly with the increase in the afore-mentioned isotope. The type of radiation emitted by potassium is that due to beta rays,[5] which are, of course, accompanied by Gamma rays. These gamma rays have been found to be stronger than those from radium C.[6] Aston[7] has recently examined the radioactive disintegration of potassium and has failed to find any trace of calcium, which would be normally expected of an element having atomic number 19 undergoing this type of disintegration. This means, therefore, that while the radioactive properties of potassium have been amply demonstrated, the position of potassium in the radioactive series of elements has still to be explained.

Of all the elements which enter the body in appreciable amounts, potassium is the only one known to be radioactive. It is our contention that this radioactive element is essential for the life processes of a cell. The life in a cell may be visioned as a delicately balanced equilibrium between highly complex molecules tending to break down into inert substances, and radiation of the proper wave length and density.

Radiation + Inert colloidal complexes = Living matter.

*Read before the New York Alumni Association of the Medical College of Virginia, November 2, 1934, with demonstration of methods of research.

There is a very narrow range or wave band of radiation as well as a sharply defined radiation density which is necessary to sustain cellular life. Beyond this it is impossible to go without producing death on the one hand or cellular division on the other. The idea is represented in Fig. 1. An

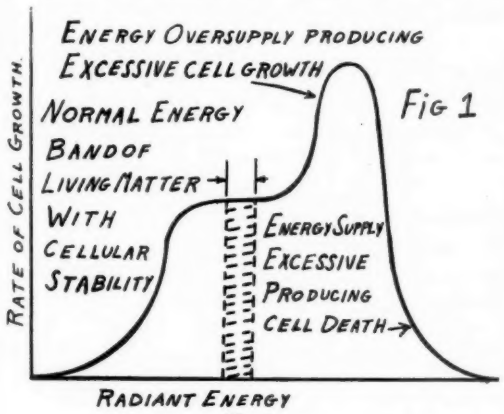

Fig. 1.

increase in the concentration of the radioactive isotope of potassium will, in terms of our theory, be mainly responsible for cellular division, because the radiant energy content or density has risen above that which is necessary for its environmental function as a cell unit. The question might well be asked: How does this increase in potassium arise?

The Conditioning Effect of Tissue Fluids on Cell Structure

Every cell will tend to reach a state of equilibrium with respect to the media in which it is immersed. According to Howell, "All the tissue elements, in fact, may be regarded as being bathed in lymph."[8] Cells, therefore, through osmosis and cellular selectivity, tend to adjust themselves to their lymph environment. The selectivity of cells has recently been demonstrated in regard to the isotopes of hydrogen in vegetable tissues, where fractionation has been shown to take place.[9]

Let us consider a simple tissue injury and its subsequent regeneration. There is first an increase in the flow of blood to the injured part with a corresponding increase in the lymph output. The lymph carries the products of injury, i. e., cellular debris, foreign matter, infecting organisms, etc., to the neighboring glands. These glands are stimulated to produce a tissue repair hormone which reaches the injured tissue by way of the blood stream. This hormone serves to condition the cell with respect to its selectivity for K_{41}, which we have shown to be so necessary for the maintenance of growth and function. The completion of the regenerative process brings to an end the stimulation of the lymph gland with regard to its hormone secretion as the cellular stability of the part is reestablished.

This theory of lymph function may be at variance with the views of the older physiologists, and more recently with those of MacLeod and others, who picture it as being purely scavenger.[10] A study of the schematic diagram of lymph and general

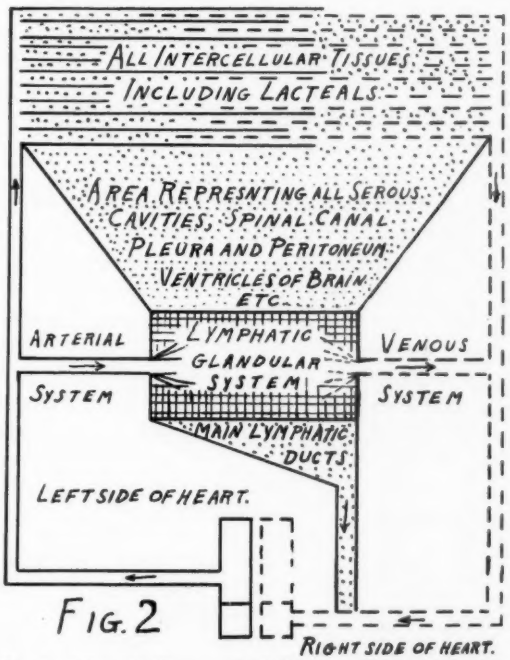

Fig. 2.—Schematic diagram of relationship of lymphatic system to all intercellular spaces and General Circulation.

circulatory system, according to our interpretation, as here presented, Fig. 2, will show:

1. The relationship of the blood circulation in all intercellular spaces to the lymph system.

2. The relationship of all lymph spaces and serous cavities, as well as all ductless glands, to the lymphatic system.

3. The relationship of all afferent lymph channels to the lymphatic glandular system and the final termination into the venous system.

A simple tissue injury may, therefore, be looked upon as a process involving, in a cycle, the injured tissue with its nearest lymphatic gland. The num-

ber of lymph glands, local or generalized throughout the body, which become involved, depends upon the extent of the injury and its chronicity. Where the lymph gland system is inadequate to meet the regenerative process, and the factors of irritation of the parts persist, a hyperactivity of the pituitary gland and possibly other ductless glands, having a correlative function, is called into play.

Evidence is accumulating in the support of the presence of a growth stimulating hormone which Burrows and Johnston have termed Archusia.[11] This we believe to be the lymph gland hormone consisting of a complex molecule containing the basic elements potassium and calcium. Its function is stimulating on the one hand and organizing or inhibitory on the other. The K_{41} acts in the first mentioned role and calcium in the latter. This is borne out by the experiments of Zwaardemaker.[12] It is an established fact that in healed and healing tuberculous lesions calcium is present in more than usual amounts. The antagonistic or mutually stabilizing properties of potassium and calcium in a gross effect has been quite clearly demonstrated in experiments with these elements on contractile tissues. We have the formula:

1. Calcium plus contractile substance equals systole or contraction.
2. Potassium plus contractile substance equals diastole or relaxation.
3. Both of these elements are indispensable in Ringer's solution.

In cases of excessive growth, gigantism, acromegaly, the anterior lobe of the pituitary gland is found to be enlarged. In acromegaly the lymphatic glands are found to be symmetrically enlarged.[13] According to Woods Hutchinson,[14] the secretions of the pituitary gland regulate growth as well as the relative proportions of the skeleton. The internal secretions of the pituitary gland are absorbed by the lymphatics.[15] The growth stimulating hormone known to be present in the anterior lobe of the pituitary gland is likely to contain a relatively large amount of K_{41}.

The Role of the Lymphatic System in Carcinogenesis

Sampson Handley[16] has definitely shown that lymph stasis is always a concomitant factor in the genesis of malignant growths. If lymph stasis is the histological picture of all precancerous states, let us consider, with reference to Fig. 2, the process through which this takes place.

1. A tissue is subjected to the chronic irritation of any given carcinogenic agent (*loc. cit.* I).
2. A persistent inflammatory condition supervenes in which the blood supply to the part is increased with a corresponding increase in the volume of lymph bathing the tissues.
3. The persistent exudate gives rise to the increased presence of fibroblasts. Fibrosis, added to the mechanical pressure of the exudate, produces an occlusion of the afferent lymph channels, and the condition of lymph stasis is the result. This fibrosis may extend to the blood vessels supplying the part, in which case we may have an apparent anemia instead of the more frequent congestion accompanying a neoplasm.
4. The lymph gland system finds itself inadequate to cope with the type and continuance of the irritation.
5. The growth hormones of the higher ductless glands are hyperstimulated.
6. The inhibitory calcium is crowded out of the scene.
7. The cells and all subsequent generations of cells are reconditioned with respect to their selectivity for K_{41}.
8. Instability—disorganization follows.

Experimental Part

The experimental technique involved in the separation of potassium from tissue, as well as the measurement of its radioactivity has occupied a considerable portion of our time.

The measurement of the radioactivity is most advantageously carried out by means of an aluminum-magnesium Geiger counter having a wall thickness of .005 inches (0.13 mm.). More details will be communicated later.

In separating hormones from the lymph glands we have sought to avoid any possibility of oxidation. We are at present attempting to effect a simplification of the lymph colloids by freezing with liquid air. We also hope to publish in the near future experimental evidence in support of this idea.

At present we are using the medullary portion of the lymph glands of the cow as the source of our hormone extract. This seems logical in view of the highly developed lymphatic system which the cow possesses as well as the relatively low incidence of malignant neoplasms found in cattle.

SUMMARY

1. A theory has been advanced to explain the role of potassium isotope K_{41} in cellular division.

2. The importance of the lymph as a medium for the circulation of growth and growth regulating hormones has been stressed.

3. The various factors in carcinogenesis following lymph stasis have been listed.

4. The above observations have been correlated so as to provide a general experimental approach to the main problem.

BIBLIOGRAPHY

1. Benmosche, M.: Carcinogenesis—A Line of Research, *Va. Med. Mo.*, 60, 671, 1934.
2. Abramson, H. A.: Electrokinetic Phenomena and Their Application to Biology and Medicine, p. 256 *et seq.*, Chemical Catalog Co., New York, N. Y.
3. Aston: London, Edin., and Dublin. *Phil. Mag.* and *Jour. of Sci.*, 42, 436, 1921.
4. Biltz and Ziegart: *Phys. Zeit.*, 29, 197, 1928.
5. Campbell and Wood: Proc. Camb. Phil. Soc., 14, 15, 1906.
6. Kolhorster: *Naturwiss*, 16, 28, 1928.
7. Aston: *Nature*, 133, 869, 1934.
8. Howell: Textbook of Physiology, p. 427. W. B. Saunders Co., Philadelphia, Pa.
9. The Isotopic Fractionation of Water by Physiological Processes. E. W. Washburn and E. R. Smith, *Sci.*, 79, 188, 1934.
10. MacLeod: Physiology and Biochemistry in Modern Medicine, p. 111. The C. V. Mosby Co., St. Louis, Mo.
11. Burrows and Johnston: See Ewing's Neoplastic Diseases, 3rd edition, p. 103, 1928.
12. Zwaardemaker: See Roffo, *Lancet*, CCXVI, 1299, 1929.
13. Acromegaly, M. Sternberg: p. 35 *et seq.* New Sydenham Soc., London, Eng.
14. Hutchinson, Woods: See Osler's Practice of Medicine, p. 1143. D. Appleton and Co., London and New York.
15. *Ibid.*: (14).
16. Handley, Sampson: *Lancet*, CCXVIII, 1383, 1930:

600 West 111th Street.

VENOUS PRESSURE AND BODY WEIGHT DETERMINATIONS IN CONGESTIVE HEART FAILURE.*

J. EDWIN WOOD, JR., M. D.,
GEORGE D. CAPACCIO, M. D.,
and
WILLIAM WEAVER, M. D.,
University, Va.

The purpose of this paper is to indicate briefly the significance of venous pressure determinations in certain patients with congestive heart failure. In view of the fact that venous pressure determinations are not always available to the general clinician we have attempted to establish a rough correlation between body weight changes and venous pressure in heart failure patients under treatment. Within certain limitations herein discussed, the body weight determinations serve as a guide to the efficacy of the treatment for congestive heart failure and not infrequently indicate the same general prognostic trend shown by venous pressure.

The determination of venous blood pressure is neither difficult nor troublesome. Until recently some of the direct and indirect methods described for venous blood pressure values served only to confuse the doctor and add to the countless pages of medical literature. This is no longer true; Griffith, Chamberlain and Kitchell[1] have described a simple and accurate modification of the direct method of Moritz and v. Tabora. This apparatus may be assembled by any physician in a few minutes, and with a few easy corrections clearly described by the authors accurate readings may be obtained. There is very little chance of error in this direct method with a needle in a vein attached through a side arm syringe to a manometer filled with saline or citrate solution. Any person who can perform venipuncture and adjust the punctured vein to the level of the right auricle can take venous blood pressure.

Twelve patients with heart disease of some sort

*From the Department of Internal Medicine, University of Virginia Medical School, University, Va.
Read before the Medical Society of Virginia, at its meeting in Alexandria, Va., October 9-11, 1934.

and with different degrees of heart failure have been studied. All of these have had venous pressure and body weight determinations at the time of admission to the hospital and again toward the end of the hospital stay. In most instances numerous weighings and several venous pressure readings have been made. Other data, including the degree of dyspnea, orthopnea and edema, as well as the grade of apparent clinical improvement and the type of heart disease have also been set down (Table I).

In order to obtain controlled readings another group of ten patients without heart disease has been subjected to venous pressure determinations, all of which came well within the normal range (Table II) of 60 to 120 mm. of water.[2]

Clinical congestive heart failure is always attended by an increase in venous pressure. In most instances this increase occurs in the systemic venous circulation and the increase may be measured. This is primarily due to failure of the right ventricle to pass the blood efficiently through the lungs to the left ventricle and usually this type of failure is accompanied by edema. There may have been previous failure of the left ventricle but in most cases of congestive heart failure both chambers are at fault with the failing right ventricle directly responsible for the increased venous pressure. In occasional instances of pure left ventricular failure the systemic venous pressure is not increased and does not increase until the right ventricle also fails.

TABLE I

CONGESTIVE HEART FAILURE

Venous Pressure and Body Weight Before and After Treatment

No.	Patient	Age	Sex	Race	Clinical Diagnosis Heart	Admission			Venous Pressure		Weight		Clinical Improvement
						Dyspn.	Orth.	Edema	Adm.	Dis.	Adm.	Dis.	
1	G.P.	59	M	W	Hypertensive and Arteriosclerotic.	++++	++++	++++	260	80	156½	123	++++
2	W.H.	46	M	C	Hypertensive and Arteriosclerotic.	++++	++++	++++	300	165	141	126	++++
3	A.M.	51	F	C	Hypertensive and Thyroid.	++++	++++	+++	315	100	132½	124	+
4	E.B.	46	F	C	Hemorrhagic Pericardial Effusion.	++	++	+	270	75	141	127½	++++
5	W.P.	38	M	W	Rheumatic Aortic Insufficiency.	+++	++++	+++	250	95	173	158	++++
6	S.M.	42	M	C	Hypertensive and Arteriosclerotic; Bundle Branch Blk.	++++	++++	++++	270	100	158	126	++++
7	C.M.	31	M	W	Rheumatic; Mitral Stenosis; Adhesive Pericarditis.	++++	+++	+++	255	250	166	155	++
8	V.B.	35	F	C	Hypertensive	++	0	++	205	140	125	100½	+++
9	H.S.	36	M	W	Rheumatic; Mitral Stenosis.	+++	+++	++	160	100	145	144	++++
10	H.D.	53	M	W	Hypertensive and Arteriosclerotic; Auricular Fibrilla.	++++	++++	++	200	100	149	134	+++
11	M.B.	43	F	W	Hypertensive	+++	++++	++	260	140	162½	151	+++
12	J.E.	33	F	W	Rheumatic; Aortic Regurg. and Stenosis; Mitral Stenosis.	+++	+++	++	145	110	105½	97½	+++

Dyspn.—Dyspnea. Orth.—Orthopnea. Adm.—Admission. Dis.—Discharge.
++++ Marked. +++ Moderate. ++ Slight. + Very slight.
Venous Pressure Expressed in MM. Water.

TABLE II

VENOUS PRESSURE CONTROL READINGS

Patients Without Heart Failure

No.	Patient	Age	Sex	Race	Clinical Diagnosis	Venous Pressure MM. Water
20	W.W.	23	F	W	Chronic Cholecys.....	90
21	G.M.	31	F	W	Catarrhal Jaundice...	60
22	J.W.	57	M	W	Diabetes Mellitus....	70
23	H.L.	31	M	W	Aplastic Anemia.....	65
24	R.H.	40	M	W	Xanthoma Tuberosum Multiplex.	90
25	C.M.	47	M	W	Multiple Neuritis.....	85
26	E.C.	25	M	W	Infectious Mononucleosis.	60
27	J.Z.	22	M	W	Epilepsy.....	105
28	E.S.	53	F	W	Secondary Anemia....	72
29	M.S.	29	F	W	No Disease.....	60

Weiss[3] has described accurately the syndrome of left ventricular failure (cardiac asthma) and discussion in this paper will be confined to right ventricular failure and failure of both ventricles. In the average type of congestive failure the venous pressure may vary from 140 mm. of water to 300 mm. of water. Owing to the number of factors contributing to venous pressure single determinations do not necessarily indicate the severity and rate of progression of the heart failure; for example, a rising venous pressure beginning at 200 mm. of water may be more unfavorable than a falling pressure starting at 300 mm. of water. It has been stated that pressures of 200 or more,[4-5] especially if rising, call for venesection. While it is not the purpose of this paper to discuss venesection in the treatment of congestive heart failure, it so happens that none of the twelve patients in Table I had phlebotomy and all recovered, at least temporarily. We do not imply that venesection is not the good therapeutic procedure that it undoubtedly often is; but we do wish to emphasize that this procedure is not always essential in the treatment of patients with high venous pressures. Of course the determination of venous pressure is a very important factor in making a decision relative to venesection, a factor to be balanced along with other clinical findings.

Recently in a number of instances of early heart failure before the apparent onset of edema we have been able to detect the condition promptly, and institute rest and other therapy. True enough, the filling of the neck veins, study of the hand and arm veins at different levels and the venous pulse excursion in the subclavian triangle may apprise the astute clinician of early failure but there comes a time when accurate measurements of venous pressure serve to reassure and further sharpen the diagnostic sense. Herein lies the chief value of venous pressure determinations. We have experienced a number of instances in which the history and physical signs did not make out a clear case for heart failure but the venous pressure level indicated that condition by abnormally high values. It has been shown before that increased venous pressure may antedate the actual signs of congestive heart failure.[6-7]

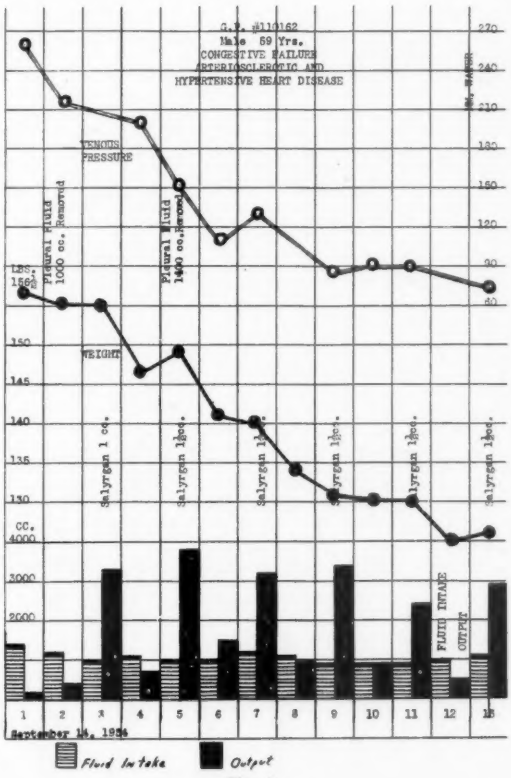

Fig. 1.

The determination of body weight in congestive heart failure patients has received too little practical attention. It is an excellent indicator of the loss

of edema fluid. For years we have depended upon the urinary output as a guide; this method is notoriously open to error, whereas body weight expresses with reasonable accuracy what is happening to the excess fluid in the patient's tissues. For example, in patient No. 1 (Fig. 1) there is a sharp fall in body weight after each successful exhibition of salyrgan, a sure and steady indication that the patient is improving. Venous pressure figures here serve a slightly different role. They tell the severe degree of failure and predict rapid improvement some six days prior to the lowest body weight. In other words, venous pressure has scaled down to normal levels here while there is still a great deal of edema present.

Although clinical correlations have been largely left out of this discussion no one can gainsay the value of signs and symptoms. Mechanical and laboratory determinations are assumed to be of secondary importance but at times are corroborative and helpful although obviously they may not supplant clinical methods of observation.

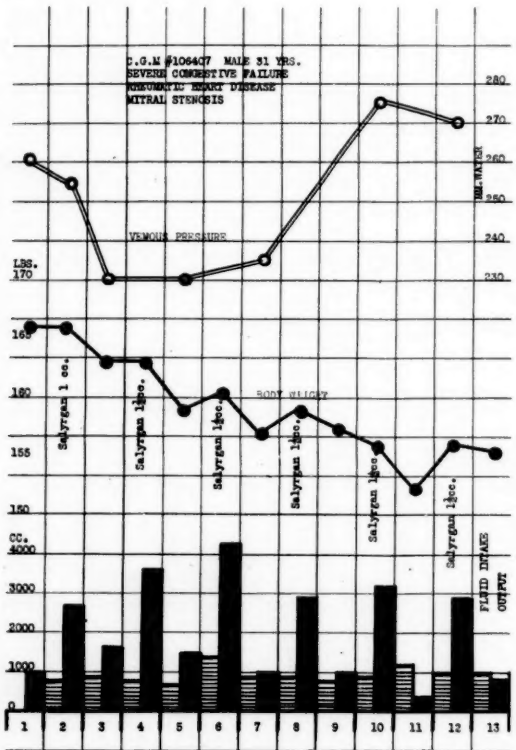

Fig. 2.

That it is not always safe to follow weight, urinary output or even clinical signs as prognostic guides is quite patent from the clinical history of patient No. 7 (Fig. 2). Here the body weight has fallen gently but the venous pressure has remained elevated. This introduces another cause of increased venous pressure not heretofore discussed, namely obstruction to venous return, which, we believe, accounts for the situation shown in Case No. 7. This patient has rheumatic heart disease, mitral stenosis, and after repeated attacks of congestive failure he was admitted to the hospital with further congestion. A low fluid intake associated with episodes of salyrgan diuresis appeared to bring about clinical improvement with a loss of eleven pounds of body weight. However, the venous pressure remained at high levels of 230 to 270 mm. of water, indicating that some unusual factor had become operative, probably a constricted pericarditis (concretio cordis). Another example of obstruction to venous return occurred in patient No. 4. This time increased pericardial pressure owing to a massive pericardial effusion interfered with venous flow effecting a high venous pressure. The removal of the pericardial effusion lead to a prompt fall in venous pressure and clinical recovery.

With the exception of the two cases just reviewed (Nos. 7 and 4) the initial venous pressures recorded on our patients have indicated roughly the degree of congestive heart failure and repeated readings have been even more helpful relative to a prognostic trend. Likewise, body weight curves have faithfully pictured the amount of edema fluid lost and have indicated improvement in fluid balance much better than urinary output records.

CONCLUSIONS

1. The apparatus for venous pressure determination described by Griffith, Chamberlain and Kitchell is simple and accurate.

2. Venous pressure determinations are helpful in the early diagnosis of congestive heart failure but prove more useful when used repeatedly to gauge prognosis.

3. The venous pressure falls more rapidly than the body weight when the patient with congestive heart failure improves under treatment.

4. Frequent body weight determinations serve as a more practical guide to the status of edema fluid in a congestive heart failure patient than do measurements or urinary output.

REFERENCES

1. Griffith, G. C., Chamberlain, C. T., and Kitchell, J. R.: *Am. Jour. Med. Sc.,* 187:371-376, 1934.
2. *Ibid,* 187:642-649.
3. Weiss, Soma and Robb, G. P.: *J. A. M. A.,* 100: 1841-1846, June 10, 1933.
4. Clark, A. H.: *Arch. Int. Med.,* 16:587-601, 1915.
5. Kastlin, G. J., and Machlachlin, W. W. G.: *Ann. Int. Med.,* 16:587-601, 1915.
6. Eyster, J. A. E.: *J. A. M. A.,* 97:1269-1271, October 31, 1931.
7. Eyster, J. A. E.: The Clinical Aspects of Venous Pressure. The Macmillan Co. New York. 1929.

DISCUSSION

DR. ALEX. F. ROBERTSON, JR., Staunton: Dr. Wood has brought very forcibly to our attention a simple and very readily adopted method in gauging our cases of congestive heart failure. We all have a great number of these cases, and I think it is a great help to have a method that is easily used by the general practitioner.

To emphasize again for a moment what Dr. Wood has said about the venous pressure, we know that the vast majority of cases of congestive heart failure are attended by an increased venous pressure. Eyster has stated that cardiac failure is that condition in which the venous pressure exceeds the range within which the heart is capable of responding by increased work to increased venous load, and sustained venous pressure above a normal level means invariably a failing heart muscle. There have been many modifications attempted in the interest of simplicity in estimating venous pressure, but they are in use only in teaching institutions. I have never attempted one myself, and I doubt if there is a practitioner here, who is not interested in cardiology, who has attempted an estimate of the venous pressure. So I think this method is increasingly important.

For the general practitioner two signs are brought out by Lewis which I think are important. One is increased pulsation in the neck veins, as observed above the manubrium, and the other is congestion of the liver.

One way of estimating the increased venous pressure, as Dr. Wood brought out, is the inverse proportion that exists between the increased fluid intake and the urinary output in these cases; but, as he said, it is very difficult to collect all the specimens, and that sometimes falls down. But I think the correlation he has shown between the venous pressure and the body weight is a very valuable procedure.

One word more in that connection, on a point I think he has not brought out. In those cases being reduced in weight by the use of salyrgan, we very often get a marked decrease in weight in the first twenty-four hours after the use of salyrgan. Then the patient may very often get an increase in body weight due to increase in fluid. They may come in in a week and apparently have not lost anything. But if we keep more frequent check on body weight, we shall find they have lost, and then have accumulated weight through increase of fluid.

DR. WALTER B. MARTIN, Norfolk: Dr. Wood has brought out some very valuable suggestions as to the management of certain cardiac cases with congestive failure. We have all seen cases that we could not compensate on the usual methods of rest in bed, reduction of salt and fluid intake, sedation and complete digitalization, but that would respond when the fluid balance was restored. As he has suggested, the mercurial diuretics, salyrgan and novasurol, used in conjunction with the ammonium salts, are very effective in restoring water balance. Following the elimination of excess fluids these hearts regain compensation and remain compensated as long as the water balance is maintained. We all recognize that failing compensation results in edema but it may also be true that accumulation of fluid in the body precedes, and in fact precipitates, decompensation.

I have in mind such a case, an elderly man who was compensated only after the elimination of excess fluids by use of salyrgan. It was then noted that he would tend to increase in weight and over a period of a few days would accumulate fluid to the extent of six or eight pounds without visible edema. Without any change in his program he would then begin to show signs of decompensation. Rales would appear at the bases of the lungs, there would be increased breathlessness and inability to lie flat in bed. Diuresis was again induced by use of salyrgan with immediate relief of symptoms and disappearance of signs of pulmonary congestion. Over a period of three years it has been necessary to continue the use of salyrgan at intervals of about five days. Throughout this time he has remained compensated and has been able to be at his office every day.

The rapid accumulation of weight in cardiac patients, an increase that cannot be accounted for by normal tissue gain, is very definite evidence that the patient is going to have trouble. The simplest way of following the course of these cases is to keep a record of body weight.

I was much interested in the case Dr. Wood showed, in which the body weight came down but the venous pressure remained elevated. He suggests the probable diagnosis of adhesive pericarditis. If it is the type of case with adhesive bands to the diaphragm, paralysis of the left diaphragm by section of the left phrenic nerve may result in striking improvement. About one year ago I had such a case in a young man. After two months of treatment compensation had not been regained. Section of the left phrenic nerve was followed by rapid improvement and eventually by complete compensation. The operation is attended with little risk and seems to be the method of choice in properly selected cases.

DR. H. S. DANIEL, Louisa: I should like to ask a question. Take a patient with beginning heart failure as we meet with it ordinarily in general practice, before he has a definite break, before he is very definitely short of breath, will the venous pressure give us an idea that that is coming?

XUM

DR. WOOD, closing the discussion: Dr. Robertson brings out quite clearly the importance of clinical observation. I do not think that we should be mechanically minded, an apparatus such as the electrocardiograph, blood pressure and venous pressure instruments should be used as evidence supporting clinical observations. It is quite possible to tell by physical examination when the venous pressure is elevated, but actual measurement is helpful in many border line cases and serves to strengthen the clinical impressions.

In reply to Dr. Daniel's question, we nearly always digitalize a patient with congestive heart failure before the trial of diuretics or other procedures.

Finally, it has been shown that the venous pressure will precede by hours the other signs of congestive heart failure. If the patient has shown the breathlessness of beginning heart failure and if this has extended to failure of the right ventricle the venous pressure will be elevated an appreciable time before edema appears.

GAS BACILLUS INFECTIONS—A STUDY OF THE INCIDENCE, TREATMENT AND MORTALITY.*

HARRY J. WARTHEN, M. D.,
Richmond, Va.

Gas gangrene, first described in 1853 by Maisonneuve,[1] became of clinical significance in the Crimean War when sixty-five cases were collected and reported by Salleron. The incidence of this infection has increased with each succeeding European war. Gas bacillus infections have been less frequent in non-European wars, due in all probability to the constantly changing and sparsely fertilized terrain over which the major campaigns were waged. This has been especially true in American conflicts and Keen[2] stated that he did not see a case of gas gangrene during the War between the States. The trench warfare of the World War offered optimum conditions for the development of gas gangrene, and Taylor[3] demonstrated the Welch bacillus in 70 per cent of the wounds from which cultures were taken. Despite its high incidence in military surgery, gas gangrene has played a relatively minor role in times of peace and only during the past few years has its increasing significance in civil surgery been recognized.

BACTERIOLOGY

The B. aerogenes capsulatus is the organism most frequently encountered in gas gangrene. This bacillus was first isolated in 1891 by Welch and Nuttall[4] from the blood of a man dying from a ruptured aneurysm of the aorta. The aneurysm eroded through the chest wall, permitting the bacillus to enter the blood stream with a resulting general emphysema. Welch described the organism as a large, straight or slightly curved, encapsulated, nonmotile, obligatory anaerobic, Gram-positive bacillus with square cut or slightly rounded ends which occurs singly, in pairs, clumps or short chains. He was unable to demonstrate spore formation in the early cultures, but this was noted by Frankel who also described the Welch bacillus the following year. The presence of spores explains the resistance of the organism and the long latent period which occasionally precedes the reappearance of an infection following delayed secondary operations.

Attempts have been made to show that the B. aerogenes capsulatus is only one of a number of gas-forming organisms and that it does not merit the prominent role formerly ascribed to it as the causative factor in the large majority of cases of gas gangrene. In 1900, Welch[1] stated that "While it has been demonstrated that various bacteria may be concerned in producing gaseous affections, it is now evident that the bacillus which I discovered in 1891 and to which I gave the name B. aerogenes capsulatus is the one whose causative agent is best established and most frequently in action." This statement is still true and while it is recognized that the Welch bacillus is frequently associated with other aerobic and anaerobic organisms, it is undoubtedly the causative organism in at least 80 per cent of gas gangrene encountered in civil practice. A number of other closely allied organisms have been cultured from gas infections, the Vibrion septique of Pasteur and the B. odematiens of Novy occurring most frequently in this secondary group.

*From the Department of Surgery, Medical College of Virginia, Richmond, Va.

Read before the sixty-fifth annual meeting of the Medical Society of Virginia, at Alexandria, October 9-11, 1934.

INCIDENCE AND MORTALITY

In 1900 Welch[1] was able to collect forty-six proven cases of gas bacillus infection. In thirty cases the Welch bacillus was associated with other organisms, usually streptococcic or staphylococci. Sixteen cases were observed in Baltimore, sixteen others were recorded by American observers and only fourteen were reported abroad. The mortality for the entire group was 59 per cent. Cramp,[5] in 1912, found 187 cases in the literature with a gross mortality of 48 per cent and reported twenty-five cases with a mortality of 44 per cent from the wards of Bellevue Hospital over an eight year period. Weintrob and Messeloff,[6] in 1927, reported eighty-five gas bacillus infections treated in the Bellevue Hospital from 1911 to 1926, with thirty-nine deaths, a mortality of 45.9 per cent. There were 618,105 admissions during this period, or one case for every 7,310 admissions. This is the largest series reported in civil life and furnishes an index to the incidence of gas bacillus infections in urban practice.

In 1930, Millar[7] collected 607 cases of gas bacillus infection occurring in civil life. No obstetrical infections were included and only proven cases in the "Post-Lister" period were reported in this series. The total mortality was 49.7 per cent. Males were affected six times as frequently as females. The third decade of life furnished the greatest number of cases. Gas bacillus infections were reported from all parts of the world and no seasonal variation was evident. Two hundred and twenty-seven of this group followed fractures, the majority of which were compounded. The tibia and femur were most frequently involved. Gunshot wounds, operations, intravenous and subcutaneous injections, gangrene and abscesses were the most frequent predisposing causes in the remainder of the cases.

TABLE 1
GAS BACILLUS INFECTIONS
Incidence—Race and Sex

Gas Gangrene	Gas Infections
24 Cases	10 Cases
Race	Race
White 6—25%	White 5—50%
Negro 18—75%	Negro 5—50%
Sex	Sex
Male 22—92%	Male 5—50%
Female 2— 8%	Female 5—50%

At the last meeting of the Medical Society of Virginia, Stone and Holsinger,[8] in reporting sixty-seven cases treated at the University of Virginia Hospital during the past twelve years, first called attention to the relatively high incidence of gas bacillus infections in Virginia. This represents one case for every 1,035 hospital admissions and is exceeded in total number only by the series reported from the Bellevue Hospital over a longer period of time. Most significant was the increased incidence during the second six year period, which was more than twice the incidence of the first. This recent increase of gas bacillus infections in Virginia is probably due to a combination of circumstances. The large number of street accidents caused by automobiles and trucks, the more general use of tractors and heavy machinery in farming and the increased industry in the South all favor the production of injuries which are prone to develop gas bacillus infections.

MILITARY INCIDENCE

Simonds[9] attributed the higher incidence of gas infections in war to the penetrating nature of the injuries, as he states that spores capable of causing gas gangrene are probably no more abundant in the soil of battlefields than in the dust from cities. He examined the uniforms of soldiers for spores and found that all the uniforms worn in the trenches contained spores of anaerobic bacteria and more than 80 per cent contained spores of B. welchii. In view of this, an incidence of only 1 per cent of gas infections in the war wounds of the American and British Expeditionary Forces appears remarkably low. The mortality in the American Army was 48.5 per cent and in the British Army was said to be between "20 and 50 per cent."[10]

LOCATION OF LESION

The usual conception of gas gangrene is that of a rapidly spreading infection, arising in and extending through muscle bundles, following penetrating and crushing injuries associated with gross soiling and the retention of septic foreign material. This is true in the majority of cases but no part of the body is immune and gas bacillus infections have occurred following herniotomies, interval appendectomies, pelvic inflammatory disease, subcutaneous and intravenous injections, tonsillectomies, intracranial injuries, tooth extractions and catheterizations.

TREATMENT

Prior to the World War the treatment of gas bacillus infections tended to be radical, and it was

generally held that an early amputation was indicated in gas gangrene of an extremity. In 1912, Cramp[5] advocated more conservative measures and reported several cases successfully treated by multiple long incisions through the involved area followed by compresses of hydrogen peroxide. Local excision of diseased muscle was practiced occasionally in civil surgery but not until the late war was the value of debridement, as we know it today, fully appreciated. At the close of the war the treatment was well standardized. This consisted chiefly of excision of all devitalized muscle, removal of foreign bodies and bony fragments, separation rather than division of uninvolved muscles, wide separation of the wound margins and insertion of Carrel tubes for subsequent irrigation with Dakin's solution. Various antisera were first used during the war with varying success. These early sera were monovalent and therefore specific for only one organism. When used indiscriminately the results were unpredictable and frequently discouraging. The present polyvalent antitoxin, an outgrowth of the war-time antisera, has proved an invaluable adjunct in the treatment of gas gangrene. Surgery has not been supplanted by the combined antitoxin but a judicious combination of these two measures has not only appreciably lowered the mortality but has frequently permitted the substitution of conservative operative procedures for former mutilating amputations.

Favorable results have followed the use of small doses of X-ray in the treatment of gas infections.[1] While this has not been used in a sufficient number of cases to warrant conclusions, Kelly states, "X-ray can do no harm, it is accessible and easily applied, and apparently has been beneficial in the reported cases."

VIRULENCE OF ORGANISM

The significance of a positive culture for the gas bacillus varies with the associated clinical condition. Keen[2] recognized this and differentiated between "Gas Gangrene" and "Gas Infections." The former, he states, "is the result of a progressive developed infection and is a most dangerous condition." This is the classical type of infection, usually seen in traumatized extremities, characterized by rapid necrosis of muscle, widespread formation of gas, and an early exodus if not vigorously combated from the onset. The second and milder form usually develops later, is frequently superimposed on a pre-existing infection, involves the muscle little if at all, produces little gas, responds

TABLE 2

GAS GANGRENE

SURGICAL TREATMENT

January 1, 1931, through December 31, 1931

Patient	Race	Sex	Age	CAUSE	Operation	Antitoxin	Culture	Hospital Stay in Days	Result
H.S.	C	M	28	Electrical Burn, Hand	Amputation		B. welchii	40	Improved
C.M.	C	F	52	Nail Puncture, Foot (Diabetic).	Amputation		B. welchii	14	Improved
J.W.	C	M	54	Ulcer, Foot (Diabetic)	Amputation		B. welchii	96	Improved
B.J.	C	M	34	Human Bite, Finger	Amputation			14	Improved
B.S.	C	M	34	Shotgun Wound, Leg	Amputation		B. welchii	14	Improved
N.C.	C	M	52	Comp'd Fracture, Tibia & Fibula.	Amputation			2	Dead
H.C.	C	M	20	Shotgun Wound, Thigh	Debridement		B. welchii	58	Well
W.T.	W	M	43	Crushing Injury, Hand	Amputation		B. welchii	50	Improved
J.W.	C	M	49	Comp'd Fracture, Tibia	Amputation			35	Improved

9 Cases—1 Death (11% Mortality); 8 Amputations; 1 Debridement.
Average Hospital Stay—35 Days.

readily to specific treatment and frequently gives the impression of being an accidental finding or at most an indication of lowered resistance of the host. Between these extremes all variations may be found. Mortality tables which include all cases presenting positive cultures are therefore misleading, especially in view of the fact that the host in many of the latter, more innocuous, cases frequently dies as a result of the underlying condition with the gas infection completely cured. In the following analysis a distinction is made between the cases of "Gas Gangrene" and "Gas Infections."

REPORT OF CASES

A study has been made of all cases of gas bacillus infection treated in the Medical College of Virginia hospitals from January 1, 1931, to the present date. This period has been chosen as it

TABLE 3

GAS GANGRENE

SURGICAL AND ANTITOXIN TREATMENT

January 1, 1932———

Patient	Race	Sex	Age	CAUSE	Operation	Antitoxin Units	Culture	Hospital Stay in Days	Result
C.M.	W	M	32	Comp'd Fracture, Radius & Ulna.	Amputation	P- T-10,000		28	Improved
W.F.	C	M	24	Shotgun Wound, Elbow	Debridement	P-1,000 T-30,000	B. welchii	45	Well
M.B.	C	F	6	Crushing Injury, Leg and Thigh.	Debridement	P-1,000 T-20,000	B. welchii	21	Well
J.H.	C	M	42	Shotgun Wound, Thigh	Debridement	P-1,000 T-50,000	B. welchii	55	Well
J.L.	C	M	25	Stab Wound, Arm	Debridement	P- T-50,000	B. welchii	94	Well
R.B.	C	M	22	Comp'd Fracture, Tibia & Fibula.	Amputation	P-1,000 T-40,000	B. welchii	82	Improved
J.W.	C	M	23	Shotgun Wound, Thigh	Debridement	P-1,000 T-20,000	B. welchii	54	Well
J.M.	W	M	45	Shotgun Wound, Thigh	Debridement	P- T-10,000	B. welchii	44	Well
N.T.	C	M	16	Comp'd Fracture, Tibia & Fibula.	Debridement	P- T-10,000	B. welchii	195	Well
E.L.	W	M	33	Crushing Injury, Arm	Debridement	P-2,000 T-50,000	B. welchii	60	Well
E.R.	W	M	41	Comp'd Fracture, Radius, Ulna & Humerus.	Debridement	P-1,000 T-40,000	B. welchii	3	Dead
W.S.	C	M	5	Comp'd Fracture, Tibia & Fibula.	Amputation	P-1,000 T-40,000	B. welchii	102	Improved
D.F.	C	M	20	Shotgun Wound, Pectoral Muscles.	Debridement	P-1,000 T-70,000	B. welchii	57	Well
R.B.	C	M	10	Comp'd Fracture, Tibia & Fibula.	Debridement	P- T-40,000	B. welchii	150*	Well
J.C.	W	M	13	Crushing Injury, Foot	Debridement	P-2,000 T-20,000	B. welchii	48	Well

*Patient still in hospital.
15 Cases—1 Death (6.6% Mortality); 3 Amputations; 12 Debridements.
Average Hospital Stay—69+ days.

coincides with the method of diagnosing and filing histories used at the present time.

Thirty-four cases of gas bacillus infection were treated, or one case for every six hundred and forty-seven hospital admissions. Positive cultures for B. welchii were obtained in twenty-eight of the infections; the remaining six were so diagnosed because of unmistakable clinical or pathological findings.

GAS GANGRENE

Twenty-four cases of typical "gas gangrene" have been treated during this period. The predisposing causes were: compound fractures, nine; shotgun wounds, seven; crushing injuries, three; electrical burn, human bite, stab wound, ulcer (diabetic), nail puncture (diabetic), one, each. All of these injuries were limited to the extremities. Eighteen patients were colored and six were white. Twenty-two patients were male and two were female.

The first nine cases, treated between January 1, 1931, and January 1, 1932, did not receive prophylactic or therapeutic injections of gas gangrene antitoxin. Surgical measures alone were used in these early infections. The involved extremity was amputated in eight cases and an extensive debridement was done in the remaining case. One patient died, a mortality for the non-antitoxin cases of 11 per cent. The average hospital stay was thirty-five days. This series is reported in detail in Table 2.

All cases of gas gangrene treated since January 1, 1932, have received gas gangrene antitoxin. The majority of accident cases presenting extensive and crushing injuries received a prophylactic injection and all cases which developed the infection were treated by large therapeutic doses of gas gangrene antitoxin. Fifteen cases have been treated since January 1, 1932. The surgical procedures have been less radical than those followed in the earlier infections. An extensive debridement was done in twelve instances and only three amputations were necessary. One patient in this series died, a mortality for the cases receiving gas bacillus antitoxin of only 6.6 per cent. The average hospital stay was more than sixty-nine days or approximately twice that of the non-antitoxin cases. This series is reported in detail in Table 3.

The combined mortality for all cases of gas gangrene was 8.3 per cent.

GAS INFECTIONS

Ten additional cases since January 1, 1931, had positive cultures for B. welchii. These correspond to the so-called "gas infections" of Keen, for the majority of these patients did not show clinical evidence of gas gangrene, and the infections in which muscle destruction could be demonstrated responded immediately to gas gangrene antitoxin. Positive cultures for B. welchii were obtained in three cases following drainage of abscesses associated with pelvic inflammatory disease. The remaining seven infections followed operations upon the gastro-intestinal tract. In six of these cases peritonitis was present at the time of operation as a result of a perforation of the small or large intestine. The remaining case followed the extirpation of a carcinoma of the colon with extensive secondary infection. The associated conditions are presented in detail in Table 4. Of especial significance is the fact

TABLE 4
GAS INFECTIONS

Developed Secondary To:	
Pelvic Inflammatory Disease	3
Shot Gun Wound of Colon	2
Carcinoma of Colon (Mikulicz operation)	1
Strangulated Femoral Hernia	1
Perforated Duodenal Ulcer	1
Ruptured Appendix	1
Ruptured Jejunum (Traumatic)	1

that seven of these ten cases had fecal fistulas when the positive cultures were obtained. As the B. welchii is a normal inhabitant of the gastro-intestinal tract, in the absence of clinical evidence of gas infection, the positive cultures may have been due to fecal contamination. Although eight fatalities occurred in this series of ten cases, only one patient had a demonstrable gas infection at the time of death. This resulted from a shotgun wound of the abdomen in an obese woman. The terminal ileum was torn across and a resection was necessary. Death occurred five days later, and an autopsy revealed a generalized peritonitis, an acute empyema from multiple perforated ulcers of the esophagus and an unsuspected gas bacillus infection of the rectus abdominis muscles. The gas infection played a minor part in this fatality and was absent clinically at the time of death in the remaining fatal cases in this series.

Of interest in this series of ten cases is the equal division of race and sex, five cases of each occurring. This would suggest that the high incidence of gas

bacillus infections in the male and especially in the Negro may be due to occupational hazards and a propensity for fighting rather than an inherent weakness of the race and sex.

PRESENT TREATMENT AT THE MEDICAL COLLEGE OF VIRGINIA HOSPITALS

All penetrating or crushing injuries, especially when grossly contaminated, are treated as potential gas bacillus infections. The wounds are excised, preferably under a general anesthetic, all foreign material is sought and removed, and light dressings are applied which permit frequent inspection of the part. After testing the patient for sensitivity to horse serum, a prophylactic injection of five cubic centimeters of gas gangrene antitoxin is given intramuscularly. This contains 1,500 units of antitetanic serum and 1,000 units each of B. welchii and Vibrion septique antitoxin. A second prophylactic injection is frequently given twelve hours later and in very extensive injuries a therapeutic dose of twenty cubic centimeters, containing 10,000 units each of B. welchii and Vibrion septique antitoxin, is injected intramuscularly. The patient is closely observed during the next few days for local or general manifestations of gas gangrene. Excessive pain in the incision or tenderness over the large vessels supplying the part is suggestive of a beginning gas bacillus infection. An increasing pulse rate is frequently the first sign of an early infection and always calls for an inspection of the wound. A markedly elevated temperature is sometimes present at the onset of the infection but the absence of fever is never reassuring, as well advanced gas gangrene may be accompanied by a normal or even subnormal temperature. Careful palpation over a suspected incision with the hand encased in a sterile glove is the surest method of determining the presence of an early gas infection. If air trapped in the incision at the time of operation and subcutaneous emphysema from pulmonary injury can be excluded, the characteristic fine crepitus is virtually pathognomonic of an underlying gas bacillus infection. The removal of sutures and demonstration of large square cut Gram-positive bacilli in the thin brownish offensive discharge completes the diagnosis for all practical purposes. Valuable time will be lost if operation is withheld until positive anaerobic cultures are obtained and only in exceptional cases is this delay justified.

A debridement under spinal or general anesthesia is immediately done through a generous skin incision with excision of all diseased muscle and thorough exposure and drainage of all involved portions of the wound. Bleeding is carefully checked, the margins of the incision are spread apart and dry gauze is loosely packed throughout the wound. The dressing is moistened at hourly intervals by one of several solutions. Dakin's solution is used when large vessels are not exposed, but the danger of a secondary hemorrhage frequently necessitates the substitution of potassium permanganate (1-5,000) or one-half strength hydrogen peroxide. The latter solution is avoided when the margins of the wound are undermined, as further extension may result from bubbles dissecting beneath the tissues. Therapeutic doses of gas gangrene antitoxin are injected intramuscularly or intravenously at intervals of four to eight hours, depending upon the extent and virulence of the infection. Twelve hours after operation the gauze is removed and the wound is inspected. Any suspicious areas are carefully palpated with the gloved hand. If the infection is still present a further debridement may be done, and only in the exceptional case is it necessary to resort to a guillotine amputation in order to check the spread of the infection. In the majority of cases the primary debridement results in an immediate local and general improvement. If the wound appears satisfactory, compresses are begun or Carrel tubes are inserted and irrigations are continued until all slough has separated and healthy granulations appear.

The blood destruction incident to gas gangrene rapidly produces a profound anemia and frequent blood transfusions are necessary. Whole blood is usually given by the multiple syringe method, especial care being taken that the syringes are used only once, otherwise infection may be carried from the recipient to the donor.

This method has been followed in the last fifteen cases of gas gangrene with considerable success. Only one fatality occurred in this series, and only three amputations were necessary. A comparison with the earlier non-antitoxin cases indicates that these favorable results have been due in a large measure to repeated injections of therapeutic doses of gas gangrene antitoxin. Prophylactic injections of the antitoxin are not always preventive, but appear to be of definite value even in the case which subsequently develops gas gangrene, for, as

XUM

Dr. Bigger[12] recently pointed out, gas bacillus infections which develop following prophylactic injections appear to be milder and more amenable to subsequent specific treatment.

CONCLUSIONS

1. Gas bacillus infections occur with surprising frequency throughout this section of the country.
2. All extensive and crushing injuries, especially when associated with compound fractures or shotgun wounds, are potential gas bacillus infections and should be treated by excision and prophylactic injections of gas gangrene antitoxin.
3. Early recognition of gas gangrene is imperative and should be immediately followed by an extensive debridement and frequent therapeutic doses of gas gangrene antitoxin.
4. Amputations should be done only when more conservative measures fail to check the spread of the infection.
5. By following this treatment the mortality from gas gangrene has been materially lowered and many amputations have been avoided at the Medical College of Virginia hospitals.

REFERENCES

1. Quoted from Welch, W. H.: Morbid Conditions Caused by Bacillus Aereogenes Capsulatus, *Bull. Johns Hopkins Hosp.*, 11:185-204, 1900.
2. Keen, W. W.: The Treatment of War Wounds, W. B. Saunders Co., 1917.
3. Quoted from Keen, W. W.: The Treatment of War Wounds, W. B. Saunders Co., 1917.
4. Welch, W. H., and Nuttall, G. H. F.: A Gas-Producing Bacillus (Bacillus Aerogenes Capsulatus, nov. spec.) Capable of Rapid Development in the Blood Vessels after Death, *Bull. Johns Hopkins Hosp.*, 3:81-91, 1892.
5. Cramp, W. C.: A Consideration of Gas Bacillus Infections with Special Reference to Treatment, *Ann. Surg.*, 56:544-563, 1912.
6. Weintrob, M., and Messeloff, C. R.: Gas Gangrene in Civil Practice, *Am. J. Med. Sc.*, 174:801-819, 1927.
7. Millar, W. M.: Gas Gangrene in Civil Life, *Surg., Gyn. & Obst.*, 54:232-238, 1932.
8. Stone, C. S., and Holsinger, H. B.: The Diagnosis and Treatment of Gas Bacillus Infection, *Va. Med. Monthly*, 61:200-204, 1934.
9. Simonds, J. P.: Studies on Bacillus Welchii with Special Reference to Gas Gangrene, *J. Exp. Med.*, 25:819-836, 1917.
10. Quoted from Millar, W. M.: Gas Gangrene in Civil Life, *Surg., Gyn. & Obst.*, 54:232-238, 1932.
11. Kelly, J. F.: The X-ray as an Aid in the Treatment of Gas Gangrene, *Radiology*, 20:296-302, 1933.
12. Bigger, I. A., in discussion of Stone, C. S., and Holsinger, H. B.: The Diagnosis and Treatment of Gas Bacillus Infection, *Va. Med Monthly*, 61:200-204, 1934.

Medical Arts Building.

DISCUSSION

DR. H. B. HOLSINGER, Farmville: Dr. Warthen has presented to this Society a powerful weapon for use in the treatment of gas gangrene. If you will review his paper you will find that up until 1900 the total mortality of gas gangrene was 59 per cent. From 1900 until 1912 there had only been a decrease of 11 per cent. From 1912 until 1926 there had been a decease of only 3 per cent, the mortality being 45.9 per cent.

Dr. Stone and I, in our reported cases, treated with a monovalent antitoxin and radical debridement, had a mortality of 15.3 per cent. Dr. Warthen has greatly improved upon this by the use of polyvalent antitoxin and reports a mortality of 6.6 per cent. I think that the greatest victory was the reduction in number of amputations in cases untreated with antitoxin from 88 per cent to those treated with polyvalent antitoxin to 20 per cent. Of course, we must not forget that the debridement is the most important factor in the treatment of gas gangrene, and antitoxin is only a secondary aid in combating the disease. Blood transfusions are also very important and I believe citrated blood is as effectual as that given by the direct method.

I wish to congratulate Dr. Warthen upon the excellent results he has obtained in treating gas gangrene.

COLLES' FRACTURE.*

M. H. TODD, M. D.,
Norfolk, Va.

I wish to call attention to three points in the treatment of the familiar Colles' fracture at the wrist.

*Read before the sixty-fifth annual session of the Medical Society of Virginia, at Alexandria, Va., October 9-11, 1934.

First, after adequate reduction of the distal fragment of the radius, there is ordinarily no particular tendency to re-displacement. Reduction can therefore be maintained by simply arranging the splint to make a little pressure over the distal fragment,

to prevent its riding back dorsally again into the silver-fork position.

The ordinary straight wood splint can be used, if desired, on the palmar surface of the forearm, or on both surfaces; but very careful attention is necessary to see that there is sufficient felt padding under the palmar surface of the radius to hold the main portion of the bone up dorsally where it belongs. It is really very much easier to use a molded plaster splint, which can be made to conform to the normal curved palmar surface of the radius without extra padding. The commercial curved Colles' fracture splint can also be used, padding it if necessary to fit the patient's forearm. In any case, the main portion of the radius must be held firmly enough to provide counter-pressure against the force holding the distal fragment in place. I illustrate these points of pressure and counter-pressure in the first picture herewith.

There is, by the way, another advantage in using molded plaster rather than a board splint: the upper end of the splint can be extended to the elbow, or part way around it, thereby maintaining partial supination and preventing the wrist from turning into complete pronation as it otherwise tends to do.

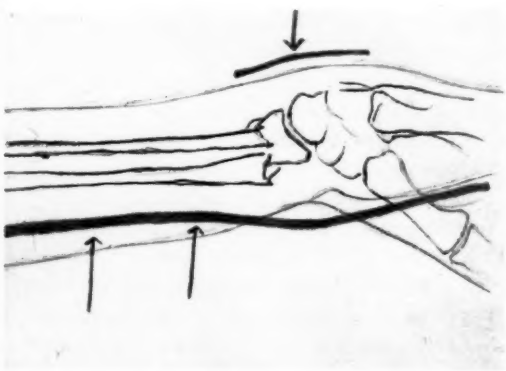

Fig. 1.—Diagram illustrating pressure and counter-pressure.

The second point I wish to make is that any splintage should permit free motion of the fingers and thumb from the very first. All small uses of the hand—writing, eating, buttoning of the clothes, etc.—should be resumed within a day or two after the injury. Office men can return to their work practically at once without loss of time. It is of immediate benefit to the whole hand, to insist on this very early resumption of actual functional use. The day when the Colles' fracture was treated by complete and prolonged fixation of the whole hand, with splints extending clear out to the ends of the fingers, is fortunately past. Such fixation could, and did, have only one result, namely, a deplorable stiffness of the hand, lasting all too frequently for the rest of the patient's life. Such treatment at once explains the notorious frequency, in the past, of lawsuits because of serious impairment of function.

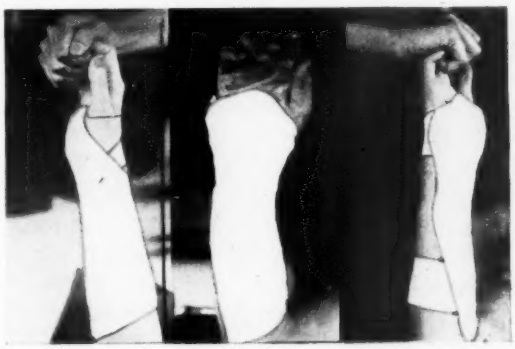

Fig. 2.—Front and lateral views of molded splint.

I illustrate in the second picture the molded plaster splint, allowing free motion of the fingers and thumb. You will notice that the splint only reaches to the life-line of the hand, not to the web of the fingers; and the reason for this is at once apparent when the surface anatomy of the hand is recalled; for, strange as it may seem, it is the life-line, not the web of the fingers, that corresponds to the metacarpophalangeal joint, as may be verified by inspection of one's own hand. Further, the splint is cut away over the thenar eminence, to allow the thumb to be brought around in apposition to the little finger. It is incidentally important to see that the thumb is also exercised in complete abduction, for, otherwise, adduction contracture may occur.

As a matter of fact, the splintage should permit the patient to make a good fist, for, otherwise, the metacarpophalangeal row of joints, the proximal knuckles, will surely stiffen more or less; and their flexibility is absolutely essential to really good use of the hand.

Moreover, a little reflection will show that no additional security of fixation of the fracture is to be gained by fixation of the fingers, as used to be done; while the all-important flexibility of the hand is

inevitably endangered, and frequently ruined by such fixation.

In these days, the usual Colles' fracture should result in a hand so flexible that the patient can resume such use as playing the piano; and such a result demands strict attention to complete finger motion, from the very first.

By the way, to go back a moment, you will notice that there is a narrow band of molded plaster of Paris extending across the dorsum of the wrist, in this second picture. This is held snugly until it hardens, thereby definitely fixing the broken fragment and preventing its return to the silverfork position. This is the arrangement that is spoken of in the first paragraph of this paper.

A little detail in putting on this little band is to see that it slants across the wrist enough to avoid pressing on the tip of the ulna. Such pressure might cause a sore, and furthermore it would precisely interfere with the restitution of normal ulnar position that I now wish to mention.

This is the third point that I wish to make in the treatment of Colles' fracture. If the lower end of the ulna is displaced, as it commonly is, toward the palmar aspect of the wrist, this deformity should be corrected. No attention is generally paid to this point, whereas it contributes a good deal to any deformity left in the end-result, as well as to pain and disability.

As a matter of fact, I have a fairly definite notion that displacement of the ulna interferes quite a little with the circulation of the hand by distorting the relations of the ulnar vessels, just as displacement of the fragment of the radius interferes with the flow of blood through the radial vessels. Better circulation of the hand is very evident when correct radial reduction has been attained; and I think that I can notice a further betterment when the ulna is put back where it belongs. Its lower end should protrude prominently on the dorsal aspect of the wrist, and should not be allowed to remain depressed, as it commonly is, toward the palmar aspect.

It is not difficult to arrange suitable padding of felt, or otherwise, along the ulnar border of the splint, to take care of this.

Fourth, and last, it is very important to give a daily inspection to the splintage of this fracture for the first several days; otherwise, as swelling abates, the splint becomes too loose. Snug, though not really tight fixation is to be maintained at all times. I forbear from more than mentioning at this point the tragedy that may follow really tight splintage left on too long, namely, ischemic contracture.

Please note that the splintage I have described is intended strictly for the Colles' type of fracture; other fractures of the radius and ulna may present different problems entirely.

I disagree very decidedly by the way, with the practice at some clinics, of immobilizing the hand away down in palmar flexion at the wrist; this is a most ungainly position in which to hold the hand, and it directly interferes with the free active usage of the fingers that is so necessary to early and perfect return of function. Further, such flexion of the hand only holds the radial fragment by indirection, by pulling on the dorsal ligaments; whereas it is so much simpler and more certain to hold the fragment by direct pressure over it. True, the method of flexion is orthodox, and many good men use it; but I see little rationale in it, and have no liking for it at all.

I have not gone into the matter of reduction of Colles' fracture, believing that you are all familiar with it; the fact is, of course, that really complete reduction of the radius must be attained, and that it should be done under adequate anesthesia, local or general. I am sure that you all know this, and that it needs no emphasis from me.

In summary, therefore, I wish to call attention to three points in treating Colles' fracture: first, splintage should hold the fracture by direct pressure and counter-pressure; second, provision for free and active use of the fingers from the first day is essential; and, third, it is important to restore the displaced ulna to its normal dorsal position.

712 Botetourt Street.

DISCUSSION

DR. H. PAGE MAUCK, Richmond: I think we are all very grateful to Dr. Todd for his presentation of this subject. I think it is a very timely one. We all know that Colles' fracture is one of the commonest fractures we have—and, I might add, the poorest treated.

The points Dr. Todd has brought out I agree with in the main, but there are just a few points I want to emphasize. I have a few slides I shall use in the discussion.

First of all, we must remember that Colles' fracture is a compression fracture. It is usually caused by falling with the hand dorsally flexed, so the back part of the

radius is the depressed part. The deformity is produced by backward displacement of the fragment and backward tilt of the displaced fragment.

(Shows slides.) This is a tracing of an X-ray photograph before and after reduction and, I think, explains that the radial deviation is accounted for by the actual shortening of the radius that takes place due to the backward tilt. An angulated bone is a shorter bone.

The backward tilt of the lower fragment, as I called to your attention, is a compression. When it is corrected, there is usually a gap between the two fragments on the posterior aspect, due to the compression. Dr. Todd told us a few minutes ago there is no particular tendency toward redisplacement. There is no tendency to redisplace after reduction, but there is a tendency for the displaced fragment to tilt backward, reproducing the silver-fork deformity.

We have looked around to find, as far as we could, a commercial type of splint. This type of splint is the one that we use in the fracture service in the Medical College of Virginia Hospital and in our own practice. It is known as a Walker splint. You can buy it at the commercial places for about seventy-five cents apiece. You can buy it for right and left, and in several different sizes. They can be used over and over, and I think it is well for anyone in general practice to equip himself with them.

If Colles' fracture is not reduced, it makes no difference what type of splint you put on. The splint itself is not going to reduce it, but it is necessary to have a splint that will maintain dorsal flexion and ulnar deviation after the reduction. In this picture the splint has been applied, but deformity still exists.

Now, in regard to reduction of Colles' fracture. It is taught by most text-books, and the practice, I think, of most is to reduce Colles' fracture under an anesthetic. It is seldom that I use an anesthetic of any kind in the reduction of a Colles' fracture, either local or general. Of course, in children, and in those cases where there are bilateral fractures, an anesthetic is necessary. If the fracture is handled gently, if at the time of reduction traction is put on the hand by an assistant shaking hands with the patient, and pulling this by gentle pressure, or by giving it a twist, the distal fragment rides into position without any difficulty. I do not believe that in the past six or eight months we have given a patient, other than a child, a general anesthetic for reduction of Colles' fracture.

I think it is criminal, in the treatment of almost any fracture, other than fracture of a metacarpal bone or a phalanx, to extend your splint beyond the metacarpophalangeal joint.

DR. TODD, closing the discussion: There is nothing further for me to say except that I am obliged to Dr. Mauck for calling attention to what is really the important thing, after all: Of course, you must get the fragment back in place. I did not emphasize that, assuming that you were all familiar with it.

In regard to anesthesia, I have been spoiled by having a very good man who puts them to sleep for a few minutes with gas anesthesia. I am coming to use less anesthesia than I did, but I generally use it.

The splint to which Dr. Mauck called attention is very good. If you use the wooden splint and avoid the tip of the ulna, bandaging across here (indicating), you get the same result that I have mentioned.

THE VALUE OF X-RAY EXAMINATIONS IN INDUSTRIAL SURGERY.*

J. T. MCKINNEY, M. D.,
Roanoke, Va.

The modern treatment of fractures has been greatly aided by the almost universal use of the X-ray. Industrial corporations, compensation boards, insurance companies, and even laymen all demand that injured workmen have adequate X-ray examinations when needed.

The accumulated experience of surgeons everywhere teaches that a proper diagnosis, and early recognition of a fracture, with prompt adequate treatment will save many days of disability, and enable the injured workman to return to his job much sooner, thereby saving thousands of dollars for his Company.

We want especially to emphasize that a careful physical examination of all injured persons should be made with the patient's clothing removed, and that a careful history of the cause of accident should be obtained, if possible, from the patient or nearby observers.

The examining physician should order an X-ray if there is pain upon motion, marked swelling or soft tissue traumatism, tenderness or undue mobility

*Read before the Association of the Norfolk and Western Railway Surgeons at its meeting in Atlantic City, September 26, 1934.

of any of the extremities or joints, with or without crepitation, or symptoms of an unusual or grave character. If, at the initial examination, the patient appears to have been only slightly injured, but later his symptoms become worse, an X-ray should be ordered.

However, judgment as well as discretion must be exercised, for not every trivial or minor injury can or should be X-rayed. This is particularly true in these days of economic uncertainty when all businesses are cutting expenses wherever possible. On the other hand, employees in some of the industries are encouraged to bring personal damage suits by unscrupulous lawyers. Some laborers can make more by drawing sick benefit insurance than by working short hours. In a great many cases of this kind a negative X-ray examination is of inestimable value.

Head injuries are of major importance, and fractures of the skull probably rank fifth or sixth in the percentage of fractures encountered. No other fracture escapes attention so easily, and it is important to know that you may acquire fractures of the skull without pain, swelling, tenderness or symptoms of any character over the site of the fracture. Tenderness is almost regularly absent in fissured or linear fractures of the skull.

Every skull receiving violence, even though slight, imparted directly or indirectly, with or without accompanying symptoms of intracranial injury or pressure, should be considered as probably fractured until proven otherwise.

The diagnosis of fracture of the skull in most cases, with the exception of compound fractures, will be made with the X-ray. Films of good detail must be obtained by the use of the Bucky diaphragm and double intensifying screens. A routine examination with eight films, consisting of two lateral views, one antero-posterior or frontal view and one postero-anterior or occipital view, all stereoscopic, should be made on all cases. The vertical and orobital plates of the frontal bone, center of the squamous portion of the temporal bone and center of the occipital fossa are weak spots in the skull and are most often injured.

Bone injury may be slight, but grave lesions of the blood vessels or brain may be present or, as is frequently noted, extensive bone injury may be present with slight cranial involvement.

Various tables of statistics show an average of eight to ten males with fractured skull to one female. About one to five cases of head injuries show fractured skull. Fractures may be complete or incomplete, that is when the inner table is fractured and the outer is not fractured. The character of a fracture line may be vertical, horizontal, oblique, circular or stellate.

If an injured head case is very irritable, and it is difficult to X-ray, a hypodermic of morphine may be administered. A negative X-ray report with continued and increasing symptoms of compression does not contra-indicate surgical procedure.

The roentgenologist must be familiar with the normal appearance of the skull. The course of blood vessels, especially the meningeal arteries, the location of the diploic veins, the suture lines and pacchionian depressions can be seen on the X-ray films, and at times may be found very confusing, and must be differentiated from a fracture line.

Fractures of the spine, just as cranial fractures, are frequently over-looked and neglected. The final diagnosis in most cases will be made with the X-ray.

They derive their chief importance from the damage to the spinal cord and nerve trunks which frequently accompany them. In no type of injury is an early diagnosis more urgent. It is important to consider the history of the injury, which may be caused by a direct blow, though the more frequent cause of fracture of the vertebrae is indirect force producing either an acute hyperflexion of the spine, or rarely hyperextension. The indirect force causes a buckling forward of the spinal column, producing the so-called "Jack-knife" position, and may be applied by a heavy object falling from above and striking the head and shoulders, or by a jar transmitted from below by a fall on the feet. Fractures by muscular action alone are rare, though they may occur, particularly of the transverse and spinous processes. Several cases are on record where the body of the vertebra was fractured and compressed by muscular effort alone. Immediately following an accident if a patient is in acute shock it is imperative to treat the shock first, and we want to emphasize the great importance of not subjecting a patient while in this condition to the extra manipulation necessary to make proper X-ray examinations. If, in addition to the shock, the patient is unconscious or if movement causes severe

pain and there is hyperpyrexia or very rapid and embarrassed respiration, the patient should not be removed to the X-ray room for a Roentgen-ray study.

Judgment and experience and a careful study of each individual case must guide the attending surgeon in his handling of each injury, as no iron clad rules can be laid down. At times a valuable preliminary examination can be made with a portable or bedside X-ray machine, the use of which we have found to be of the greatest help.

It is essential that stereoscopic antero-posterior, lateral and frequently oblique films be taken on all cases of suspected spinal injuries. We particularly wish to stress the great value of the oblique or semi-oblique view, more especially in injuries of the cervical vertebrae. In our industrial work, very definite fractures, previously reported negative by other observers, have been found by a careful recheck and Roentgen-ray study with the oblique view, this type of fracture being impossible to demonstrate with a straight lateral or antero-posterior view.

If the roentgenolgist turns in a preliminary negative report and the patient continues to have clinical symptoms, we want to urge the referring surgeon to insist on another X-ray study. We want to emphasize the great importance of the roentgenologist covering not only the area in which the injury is suspected, but he should also examine both below and above the suspected involved area.

We have stressed fractures of the head and vertebrae because they usually give us the most serious trouble. However, injuries in many other parts of the body may also assume major importance. Fractures of the small bones of the wrist and foot can easily escape detection, and, if not diagnosed and properly treated, will cause prolonged disability.

To mention one case in particular, a fractured scaphoid and dislocation of the semilunar were not detected until several months after the injury. Treatment was instituted but the railroad employee was off from work for over a year.

Several views for fracture of the patella and os calcis should frequently be taken.

Epiphyseal injuries are most important and should be early diagnosed and promptly treated.

The necessity of frequent re-checks or X-ray examinations, following the various methods of treatment, is essential, first to determine the alignment and position of the fragments, and, second, to determine the process of repair and throwing out of callus, with or without delayed union. A modern fracture service demands prompt reports on the X-ray examination for the sooner the fracture is set the easier it will be.

We want to urge against the indiscriminate showing of films to patients. Often there is a good functional result obtained, when the anatomical result is not perfect.

The roentgenologist should be skilled and familiar with all branches of X-ray work, other than fractures or bone injuries. Only several days ago a male, age thirty, who had sustained an injury six months ago, falling fifteen feet, came into my office complaining of his head. To use his own description, "He had a sad head." Both he and his father and lawyer thought all his symptoms were due to his fall. Upon a complete negative X-ray of his spine and pelvis, we X-rayed his head and found definite involvement of his right antrum and ethmoids. A nose and throat specialist drained his antrum and treated his infected ethmoids. His fall of course had no connection with his present trouble.

A patient came in the hospital the other day with an injured shoulder, fractured through the tuberosities, with a portion of the left lung field showing on the film which looked like cancer. Further examination revealed extensive metastatic malignancy throughout both lungs, pelvis and lumbar vertebrae. Another injured shoulder "so-called," upon X-ray examination proved to be a calcified bursitis. An injured elbow in a carpenter proved to be a bone cyst.

To summarize:

1. The use of the X-ray is only a part, but a very important part, in the handling of injured patients.

2. We again want to emphasize the necessity of proper and thorough physical examinations by the attending surgeon before ordering an X-ray.

3. It is most important if a patient continues with clinical symptoms, even though the first X-ray examination was negative, to order another X-ray.

4. Numerous fractures may escape attention unless films are taken from a number of different views and angles.

5. The roentgenologist has a responsibility he

must not shirk, for his report should be accurate and dependable. Technicians are indispensable, but wherever possible a roentgenologist or qualified physician should see the patient and direct the X-ray examination with the exposure to be made.

6. The area X-rayed should cover not only the part injured but a considerable portion above and below the injured area. This is particularly true of injuries of the spine, where pain is referred below the site of the injury. A direct blow may not cause a fracture over the area struck, but some far removed area. For instance, a blow on the head with fracture of the vertebrae; a blow over the patella, with fracture of the femur; a fall, landing on the feet and os calces, with fracture of the shaft of the tibia, or fracture of the vertebrae.

Public Health Statistics

I. C. RIGGIN, M. D.
State Health Commissioner of Virginia

The communicable disease reports received at the office of Dr. G. F. McGinnes, State Epidemiologist, during the month of June, 1935, show the following cases compared with the same month in 1934:

	1935	*1934*
Typhoid and Paratyphoid Fever	55	57
Diphtheria	32	41
Scarlet Fever	90	69
Measles	1,171	3,762
Meningitis	38	13
Poliomyelitis	52	5
Rocky Mountain Spotted Fever	5	9
Typhus Fever	1	0
Undulant Fever	6	4
Tularaemia	4	4
Smallpox	0	1

Within the last six weeks there has been a definite increase in the incidence of the disease Acute Anterior Poliomyelitis in the State of Virginia. Because of this increased prevalence the State Department of Health has deemed it advisable to use every possible means to combat its spread by means of bulletins which will be dispatched at intervals to the physicians of the State in order that they may be kept posted as to the number of cases. In these bulletins methods of diagnosis, the use of convalescent serum, the importance of after-care, et cetera, will be discussed. Through the consulting diagnostic service established by the Department several years ago, aid will be given in the diagnosis of the disease when requested.

The State Department of Health has on hand an adequate supply of convalescent serum which is available to those physicians who wish to use it. However, in furnishing serum the Department guarantees nothing more than its sterility, holding out no surety as to its therapeutic value. On the contrary, what evidence there is available would strongly suggest that the serum while harmless, is of no value in the treatment of the disease, even in its pre-paralytic form.

On this subject we quote an editorial from a recent issue of the *New England Journal of Medicine:*

"As the next few months will inevitably witness a normal seasonal increase in the incidence of the disease, and may even see the unfolding of an epidemic that no one today can foresee, it is well that the medical profession should realize the limitations of a serum, the use of which is too often based on emotional rather than scientific grounds.

"With the attention given to infantile paralysis during and after the 1916 epidemic, it was devoutly to be hoped that some specific therapeutic agent might be found. For some years, the studies carried on in this State under the auspices of the Harvard Infantile Paralysis Commission offered encouragement to the belief that the serum, if used in the pre-paralytic stages, might be of some therapeutic value in minimizing the subsequent paralysis. Even through the 1931 epidemic individual instances were numerous in which favorable effects followed, and might therefore be due to the serum. Even these, however, were subject to the criticism provoked by a lack of control cases, for it was manifestly impossible to make certain that the treated cases had not been of milder type than those already paralyzed and therefore not treated. Studies in other States, where serum was not so readily available and where more skepticism existed as to its value, showed beyond dispute that when the value of serum was measured by comparison with a control group of alternate cases, no scientific evidence could be brought forward to support the belief in its efficacy.

"Thus were shattered our hopes that convalescent serum might serve as a specific therapeutic agent.

It is safe to say that in its continued use today, the physician is merely hoping against fact that his particular case will in some way show some improvement that may be attributed to the serum. In the absence of any other specific therapy, and keeping in mind the popular hysteria with respect to the disease, the use of the serum is not greatly dissimilar to the drowning man's frantic grasp at a passing straw. The most that can be said for the serum is that its use may to a certain degree allay popular panic, and give to the victim's parents a measure of comfort in the thought that something tangible is being done. Beyond this it is apparently of little value. It is to be hoped that the medical profession in its proper eagerness to afford to its patients every possible aid to recovery, will not lose sight of the real facts as to the value of convalescent serum."

In furnishing this serum the State Department of Health is thus departing from its established policy of distributing only biologics and pharmaceuticals of unquestioned value. Because there is some evidence that the serum is of value as a preventive agent, the serum is available not only in 25 c.c. ampules for those who wish to use it therapeutically but it is also put up in 10 c.c. ampules to be used as a preventive where there has been a definite history of exposure to the disease.

Woman's Auxiliary to the Medical Society of Va.

President—MRS. JOSEPH BEAR, 3012 Monument Ave., Richmond.
President-elect—MRS. FLETCHER J. WRIGHT, Petersburg.
Recording Secretary—MRS. JAMES B. STONE, 2042 Park Ave., Richmond.
Corresponding Secretary—MRS. AMBROSE MCGEE, 4107 Kensington Ave., Richmond.
Treasurer—MRS. REUBEN F. SIMMS, 2034 Park Ave., Richmond.

Report of the National Auxiliary Meeting.

The annual meeting of the Woman's Auxiliary to the American Medical Association was held in Atlantic City, N. J., June 9-14, 1935, at the Traymore Hotel, with the wives of the Canadian Medical Association as our honored guests.

Sunday evening and Monday, the National Board was in session at which time Virginia was represented by our able and enthusiastic President, Mrs. Joseph Bear.

The General Meeting of the Auxiliary opened Tuesday at nine A. M. with the National President, Mrs. Robert W. Tomlinson, presiding. The usual order of business was followed, with reports from all standing committees and the roll call of the States. Some of the outstanding points from the committee reports were as follows:

ORGANIZATION COMMITTEE: The Chairman reported two new States organized, New York and North Dakota. The National Auxiliary now has a total membership of 15,692 which is an increase of 1,144 over 1934. Texas had the most new counties organized but Wisconsin had the most new members for the past year.

PROGRAM COMMITTEE: The Chairman reported many States doing outstanding work along public relations, health radio talks and around health examinations for high school and college students as well as younger children.

HYGEIA COMMITTEE: The Chairman reported an increase in circulation of 2,138 copies with Wisconsin leading with 1,139 subscriptions; thirty-eight States reported and eighteen States increased their subscriptions for 1934.

EXHIBIT COMMITTEE: The Chairman reported that twenty-six States sent exhibits which proved very interesting. Exhibits ranged from scrap-books and baby layettes to a most interesting collection of very old medical instruments and the evolution of nursing history in the form of dolls dressed to represent the different phases and periods of nursing.

Tuesday's session closed with recommendations from the National Board.

Wednesday, June 19, the major part of the session was given to hearing States' reports, which proved both interesting and inspiring. There are forty-three States organized and thirty-seven reports were read. All States reported the general lines of welfare, health education work and legislative work. Two of the newest projects were setting aside an annual Doctor's Day to commemorate the work done by doctors and every State giving special attention to Mother's Day.

Wisconsin should receive special commendation since they had 100 per cent increase in membership, led in *Hygeia* subscriptions and succeeded in using

their influence to have all advertised medicine taken off of the radio in their State and furnished our most promising and efficient President-Elect, Mrs. Robert Fitzgerald.

The Chairman of registration and credentials reported 1,431 women registered with forty-seven Canadian guests.

Mrs. Rogers N. Herbert, of Tennessee, was introduced as the new President and was presented with the gavel and President's pin.

The entertainment side of the convention was splendidly arranged by the committee in charge. With dinners, luncheons, musicales, teas and receptions, there was not a leisure moment.

We all left Atlantic City with a desire to linger but with the hope of meeting in Kansas City in 1936. Why not plan now to go to Kansas City next June and catch some of the vim, vigor and enthusiasm of other State Auxiliaries?

(MRS. REUBEN F.) ANNIE P. SIMMS,
Delegate.

Truth About Medicine

In addition to the articles previously enumerated, the following have been accepted by the Council on Pharmacy and Chemistry of the A. M. A.:

Abbott Laboratories
Abbott's Cod Liver Oil.
Hynson, Westcott & Dunning
Surgical Solution of Mercurochrome—H. W. & D.
Lederle Laboratories, Inc.
House Dust (New York Apartment House), Allergenic Extract—Lederle.
Merck & Co., Inc.
Aminoacetic Acid—Merck.
Parke, Davis & Co.
Antipneumococcic Serum (Felton), Types I and II Refined and Concentrated.
E. R. Squibb & Sons
Soluble Gelatine Capsules Squibb Stabilized Halibut Liver Oil.
Soluble Gelatine Capsules Squibb Stabilized Halibut Liver Oil with Viosterol.

ACCEPTED DEVICES FOR PHYSICAL THERAPY

The following apparatus has been accepted by the Council on Physical Therapy of the American Medical Association for inclusion in its list of accepted devices for physical therapy:

Victor Electrosurgical Machine.—This device is recommended for electrosurgery only. The frequencies are well above neuro-muscular response. The efficiency varies from 8 to 30 per cent, depending on the conditions. The high frequency power generated varies from 46 to 177 watts for the "scalpel" connection and from 15 to 90 watts for "coagulation." General Electric X-Ray Corporation, Chicago. (J. A. M. A., June 15, 1935, p. 2186.)

Inductotherm.—The purpose of this short wave diathermy machine is to administer therapeutic heat to the body tissues, thus producing a heating effect comparable to that of diathermy. Conventional electrodes are not used, and no metal to skin contact is made with the patient. Burns are possible with this machine, but the chances of burns are less than for conventional diathermy. General Electric X-Ray Corporation, Chicago. (J. A. M. A., May 11, 1935, p. 1705.)

Elliott Treatment Machine.—An electrical machine recommended for applying heat therapy for the treatment of inflammatory diseases of the pelvis. Treatment is accomplished by prolonged and sustained application of heat. Hot water, the temperature of which may be controlled by the physician, is circulated through anatomatically shaped, distensible applicators made of latex. The unit was found to give good service in the conditions recommended, such as inflammatory diseases of the pelvis attended by pain, backache, menstrual irregularities and chronic exhaustion. Manufactured for and distributed by the Treatment Regulator Corporation, Detroit, and the A. S. Aloe Company, St. Louis. (J. A. M. A., May 18, 1935, p. 1823.)

Book Announcements

New Books in the Library of the Medical College of Virginia.

The following and other books may be borrowed from the Library by members of the Medical Society of Virginia, the only charge being return postage:

Adams, E. W.—Recent researches on the nature and therapy of pernicious anemia.
Agard, Walter—Medical Greek and Latin at a glance.
Amelink, F.—Schema zur mikrochemischen identifikation von alkaloiden.
American Medical Association—Hospital practice for interns.
American School and University, 7th edition.
Bartlett, F. C.—The problem of noise.
Berglund, Hilding and Medes, Grace—The kidney in health and disease.
Berman, Louis—The glands regulating personality.
Black, C. E.—Names of surgical operations.
Brunt, David—Combination of observations.
Clark, Kenneth—A catalogue of the drawings of Leonardo da Vinci.

Lewis, Sir Thomas—Clinical science.
Conklin, Edmund S.—Principles of adolescent psychology.
Crane, George W.—Psychology applied.
Department of scientific and industrial research. Report for 1933-34.
Dobson, J. O.—Ronald Ross: Dragon-slayer.
Dorcus, Roy M., and Shaffer, G. Wilson—Textbook of abnormal psychology.
Fishman, Joseph F.—Sex in prison.
Fracastoro, Girolamo—Frascator: Syphilis or the French disease.
Franklin, Edward C.—The nitrogen system of compounds.
Gervais, Alfred—A surgeon's China.
Goepp, R. M.—Dental state board questions and answers.
Goodenough, Florence L.—Developmental psychology.
Haldane, J. B. S.—Human biology and politics.
Harding, T. Swann—The popular practice of fraud.
Harrington, Milton—Wish-hunting in the unconscious.
Harrow, Benjamin, and Sherwin, C. P.—Textbook of biochemistry.
Jarcho, Julius—Posture and practice during labor among primitive peoples.
Kuechle, B. E.—Symposium on silicosis.
Kuno, Yas—The physiology of human perspiration.
Landon, John F., and Smith, L. W.—Poliomyelitis.
Leakey, L. S. B.—Adam's ancestors.
Loeb, Harold and Associates—The chart of plenty.
Luck, J. Murray—Annual review of biochemistry, 1935.
Meaker, S. R.—Human sterility.
Mellanby, Edward—Nutrition and disease.
Miller, Richard H.—Tuberculosis of the lymphatic system.
Monroe, Margaret T.—Breaking out of prison.
Murchison, Carl—A handbook of social psychology.
Nicholson, D.—Laboratory medicine.
Novak, Emil—The woman asks the doctor.
Parsons, T. R.—Hints on taking notes at lectures.
Patterson, A. M.—German-English dictionary for chemists.
Reports on public health and medical subjects, No. 71.
Rietz, H.—Mathematical statistics.
Scott, H. Harold—Some notable epidemics.
Springstun, H.—Doctors and juries.
Watson, Frederick—The life of Sir Robert Jones.
Wells, H. Gideon—Chemical aspects of immunity.

Emotions and Bodily Changes. A Survey of Literature on Psychosomatic Interrelationships, 1910-1933. By H. FLANDERS DUNBAR, M. D., Ph. D., Departments of Medicine and Psychiatry, Columbia University. Published for the Josiah Macy, Jr., Foundation, by Columbia University Press. New York, 1935. Octavo of xv-595 pages. Cloth. Price, $5.00.

It is only recently, as the history of medicine reveals, that much attention has been devoted to the scientific study of emotion and of the bodily changes that accompany diverse emotional experience.

In this book, the author, covering the medical literature of 1910-33, brings out clearly that "many physiological processes which are of profound significance for health, not only of the individual but also of the group, can be controlled by way of the emotions." This knowledge can be of great assistance in the prevention and treatment of illness, yet few know how to use it.

According to various medical authors quoted, 40 to 50 per cent of the problems of the acute stages of a somatic illness and from 50 to 75 per cent of the difficulties of convalescence have their primary origin in the mind rather than the body of the patient.

Reviewing further the medical literature on the subject the author finds three distinctly different attitudes among practicing physicians toward the relationship of mind and body in acute and chronic illness:

(1) Those who attempt to find an organic condition to account for every mental state.

(2) Those who see only the mental and overlook the organic.

(3) Those who see organic as well as psychic pathology from a psychosomatic point of view. (This last approach might be termed the psychobiologic, determined by the newer understanding of the organism as a whole.)

As the author states, this book "represents an attempt to bring together in some sort of perspective the research material which has combined to develop those concepts in medicine which are the necessary foundations for further research in the sphere of psychosomatic problems."

The volume is especially commended to the attention of all who are interested in obtaining a knowledge of physical-mental relationships as an aid to therapeutic procedures.

HARVIE DEJ. COGHILL, M. D.

Virginia Medical Monthly

Founded by LANDON B. EDWARDS, M. D., April, 1874
Owned by MEDICAL SOCIETY OF VIRGINIA since November, 1919
WYNDHAM B. BLANTON, M. D., *Editor*
AGNES V. EDWARDS, Richmond, *Business Manager*

PUBLICATION COMMITTEE
WYNDHAM B. BLANTON, M. D., Richmond, *Chairman*
J. H. NEFF, M. D., University H. A. TABB, M. D., Gloucester

All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Monthly, 1200 East Clay Street, Richmond, Va.

This journal is not responsible for the opinions and statements of its contributors.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

Subscription Price: $2.00 per annum in advance. Single Copies 25c.

VOLUME 62 AUGUST, 1935 No. 5

Editorial

Gentlemen from Virginia.

The American Medical Association the other day made another Virginia-born doctor its president-elect. This time it was James Tate Mason who received the honor. Dr. Mason first saw the light of day in Orange County, Virginia, May 20, 1888, where his father long practiced medicine. He himself took his medical degree from the University of Virginia and shortly afterward moved to the great Northwest. Since that time he has figured as a medical luminary in Washington, the state of his adoption. It is a coincidence that Dr. Mason's immediate predecessor in office, James S. McLester, a native of Alabama and the present president of the Association, also received his medical education at the University of Virginia.

All of this recalls the fact that the first president of the American Medical Association, Nathaniel Chapman, eminent editor, author and professor of Philadelphia, was born in Fairfax County, Virginia; that the fifth president of the Association was Beverley Randolph Wellford of Fredericksburg and Richmond; that the fortieth president, A. Y. P. Garnett, C. S. A., prominent physician of the District of Columbia, and personal physician to President Davis and General Lee during their Civil War residence in Richmond, was born in Essex County, Virginia; that the forty-first president, William Wirt Dawson, distinguished teacher and surgeon in Cincinnati a generation ago, was born in Berkeley County, Virginia; that the forty-fifth president was our own Hunter McGuire; and that the forty-ninth president, Richard Beverley Cole, Gold Rusher of the early fifties and later leading obstetrician and gynecologist of California, was born in Manchester, Virginia.

It is noteworthy that only Wellford and McGuire were at work in the state at the time of their election to the presidency of the American Medical Association. It has been forty-three years since a Virginia doctor has won this high office. We can only take comfort in the repeated instances in which the distinction has come to Virginia's sons who were born and bred in the Old Dominion.

Broders and His Work.

We are glad to have Dr. Albert C. Broders, formerly Division Head of the Department of Surgical Pathology at the Mayo Clinic, back in Virginia. He is a native of Fairfax County and a graduate of the Medical College of Virginia. He will become Director of Cancer Research in his alma mater and will assume charge of the Department of Surgical Pathology. Dr. Broders' best known contribution to medicine is perhaps in the grading of malignant growths. The possibility of variability in malignancy of cancer has long been known. In fact for many years it has been pretty well recog-

nized that the type of cancer, as well as its localization, were important factors in arriving at some idea concerning its malignancy. But it is only within recent years that cytologic investigations have led to what appears to be a more serviceable method of grading malignancy. In this advance Broders has been a pioneer, pointing out the absolute necessity on the part of the surgical pathologist of being "familiar with the biological status of the cells of the cancer to be graded," being able to distinguish certainly between differentiated and undifferentiated tumor cells. The grading of cancers has been facilitated by a numerical expression of the relation of these differentiated cells to those which are undifferentiated, grades 1, 2, 3, 4, indicating an ascending scale of malignancy. A proper sort of pathological report should give not only a morphological classification but also a grading by the method adopted and popularized by Broders, for as he has pointed out the grading of cancer not only has prognostic value, but may also prove of vast assistance to the surgeon in determining what operative procedure is indicated.

The Surgical Treatment of Hypertension.

The outlook in the severer grades of essential hypertension has been generally regarded as serious, the patient rarely living longer on an average than eighteen months after the diagnosis has been established. This type of hypertension may therefore be considered as grave a clinical problem as cancer, and any measure, however heroic, which offers promise of curing it or even of abating its rapid progress is to be considered. Recently two important reports concerning the surgical treatment of hypertension have been made. The first was contributed by George E. Brown, Winchell McK. Craig, and Alfred W. Adson and appeared in a recent issue of *Minnesota Medicine*. The other was presented at the Atlantic City meeting of the American Medical Association by Max M. Peet. From the Minnesota workers we learn that bilateral rhizotomy, usually from the sixth thoracic to the second lumbar, may be productive in suitable cases of astonishing results. Patients who have complained of headache, dizziness and visual disturbances experience great relief. Inordinately high blood pressures show sharp falls—in one instance the systolic drop was more than 100 m.m. of mercury, although the mean value usually varies between 35 and 100 m.m. of mercury. There are also interesting concomitant physiological changes, such as diminished variability of blood pressure readings, reduction of the vasopressor response to cold, rises in blood pressure on assuming the recumbent posture, and delayed water excretion. Untoward effects have been recorded as loss of sweating below the level of the diaphragm, pain in the lower extremities, loss of strength in the legs and weakness of the abdominal muscles.

Unfortunately all cases of essential hypertension do not appear to respond favorably to resection of spinal nerve roots. Those cases in which failure has attended the operation are probably complicated by extensive changes in the arterioles. It is for this reason that selection of cases has to be carefully carried out. All of the criteria have not yet been established, though the age of the patient, the duration of the disease, the function of the kidney, "the cold test," as well as the emotional response have to be carefully considered. Biopsy for a suitable specimen of muscle in which the arterioles may be studied should form a part of the preliminary study of the patient. Brown and his co-workers report one case in which four years after operation the lower levels of blood pressure were still maintained.

The Carrier of Poliomyelitis.

No one would go or carry children, especially those under fifteen years of age, into an area where the incidence of poliomyelitis was high. No one would question the properiety of quarantining the acute case, or of sending other children of the household to a safe distance, nor would one question the wisdom of protecting children from the convalescent case well beyond the present recognized stage of contagiousness. There are possibly few who, in the presence of an epidemic, would object to viewing every case of acute upper respiratory disease and every case of acute gastro-intestinal upset as possibly an abortive case of poliomyelitis. But probably too little attention has been paid to the rôle of the so-called healthy carrier—the individual who has had varying degrees of contact with an active case, presents no symptoms himself, and without knowing it, goes about spreading the disease to susceptible individuals. That such healthy carriers exist has been repeatedly shown by the experimental work of numerous investigators who have demonstrated by the inoculation of animals the presence of the virus in naso-pharyngeal washings. Lucas and Osgood in

this way produced the disease in a monkey "four months after a second attack and two years and three months after his first attack." That such healthy carriers exist has also been shown by epidemiological investigations clearly tracing one acute case to another at a widely distant point by way of such a carrier.

What public health measures are effective in arresting the spread of this disease remain yet to be demonstrated. The identification and control of the abortive case, believed to be about four times as numerous as the frank paralytic case, is a baffling problem. It is exceeded in complexity only by the difficulty of recognizing and controlling the healthy carrier. It is apparently not practical at present by cultural or inoculation methods to identify the healthy carrier. Only by the human tragedy he leaves in his wake can we now sense his presence. Until public health students throw more light upon this whole subject our course as physicians becomes one of warning against the frequence and danger of abortive cases and the necessity for their quarantine and it becomes incumbent upon us to regard every contact with an acute case of poliomyelitis as a potential carrier who should be shunned like the plague by all who are susceptible.

Can Summer Hay Fever Affect the Incidence of Winter Colds?

The Medical Society of the State of New York in a recent news release from its Public Relations Bureau calls attention to what appears to be an important observatioa:

"That people who suffer from hay fever in summer are more susceptible than others to common colds in winter, but if treated with pollen extract for hay fever they show greater immunity to colds later." This statement was made by Dr. Louis Sternberg as a result of observations over a period of six years among patients at Beth Israel Hospital.

His report, published in the July 15th issue of the *New York State Journal of Medicine*, says in part: "The author has reviewed the histories of 200 treated cases of hay fever observed from one to six years, and finds that fifty-three gave a previous history of frequent colds usually in winter. After their first seasonal or perennial course of treatment with pollen extract, thirty-six of the fifty-three stated that they had been relieved of head colds throughout the winter months following their treatments. Of this total number, twenty-five were sensitive to ragweed, eight to timothy, and three to both ragweed and timothy. The seventeen cases not relieved of winter colds did not have much relief from the pollen injections."

"The reason, " states Dr. Sternberg, "for this apparent immunity to the infection known as the common cold is not now known. It is presented as a clinical fact that remains to be explained. That those suffering from hay fever or asthma are generally more subject to upper respiratory infections than other individuals is a well-known fact, but few among the numerous publications on the 'common cold' have ever mentioned how these colds are influenced by pollen treatment in hay fever subjects."

The question which this report raises is whether or not the incidence of pneumonia, recognized so frequently as a sequel of the common cold, can be affected by the proper treatment of hay fever. About 100,000 Americans die annually from pneumonia. The disease ranks third among the causes of death, being exceeded only by heart disease and cancer. Any preventive measure, therefore, which offers the least hope of reducing this high mortality deserves more than passing notice.

Department of Clinical and Medical Education of the Medical Society of Virginia

The third of the postgraduate clinics in Pediatrics conducted during the year by this Department was sponsored by the Northampton-Accomac Medical Societies. The meetings were held in the Northampton-Accomac Memorial Hospital and were under the direction of Dr. George M. Lyon, specialist in Pediatrics, of Huntington, W. Va. The meetings were held daily and began July 8th and con-

tinued through July 19th. The following doctors were in attendance:

Dr. S. K. Ames
Dr. C. E. Critcher
Dr. J. L. DeCormis
Dr. H. L. Denoon
Dr. C. M. Easter
Dr. J. F. Edmonds
Dr. W. T. Green
Dr. J. R. Hamilton
Dr. W. C. Henderson
Dr. G. W. Holland
Dr. J. W. Jackson
Dr. J. M. Lynch
Dr. E. H. Trower
Dr. Rooker White
Dr. A. F. Wood

The fourth postgraduate clinic in Pediastrics began July 22nd in Norfolk and is being sponsored by the Norfolk County Medical Society. The meetings are being held daily from four to six in the King's Daughters Clinic Building and will continue for two weeks. Enrollments will be reported in the next issue of the MONTHLY.

The Christiansburg postgraduate clinic in Pediatrics, under the direction of Dr. Samuel F. Ravenel, of Greensboro, N. C., has completed its meetings.

Clinics for Negro Physicians.

The annual postgraduate clinics for Negro physicians, given under the auspices of the Medical College of Virginia, were held at St. Philip Hospital, Richmond, the last two weeks in June, with an enrollment of forty-one. While the majority of these were from Virginia, there were several from other states. Dr. Lee E. Sutton, dean of the Medical School, was director of the clinics and was assisted by members of the college faculty.

GEORGE B. ZEHMER,
Executive Secretary.

Proceedings of Societies

Virginia State Board of Medical Examiners.

Of the total number of applicants before the meeting of the Virginia State Board of Medical Examiners, June 19th-21st, there was only one failure. There were 110 successful applicants, including twelve by reciprocity. Following is the list of those granted certificates:

Dr. Benjamin R. Allen, Richmond, Va.
Dr. John E. Alexander, Norfolk, Va.
Dr. John William Ashworth, Jr., Coeburn, Va.
Dr. William E. Apperson, University, Va.
Dr. William Bennett Bean, University, Va.
Dr. Charles Lewis Bittinger, Bunker Hill, W. Va.
Dr. Charles Atlas Bland, Clover, Va.
Dr. George S. Bowers, Richmond, Va.
Dr. Richard B. Bowles, Clifton Forge, Va.
Dr. Robert Dwight W. Brown, Woodstock, Ill.
Dr. Alexander G. Brown, III, Richmond, Va.
Dr. William W. Butzner, Fredericksburg, Va.
Dr. George M. Caldwell, Radford, Va.
Dr. Sheldon David Carey, Roanoke, Va.
Dr. Hugh Tucker Chelf, Jr., Culpeper, Va.
Dr. William H. Chapman, Jr., Smithfield, Va.
Dr. David Stanford Clayman, Martinsville, Va.
Dr. William Malvern Clopton, St. Louis, Mo.
Dr. George Cooper, Jr., Louisville, Ky.
Dr. Kenneth Cooper, Lynchburg, Va.
Dr. Howard Harman Curd, Seattle, Wash.
Dr. Richard A. Cupaiuoli, Hoodcliff-on-Hudson, N. J.
Dr. Margaret DeRonde, University, Va.
Dr. Harvey M. Diggs, Suffolk, Va.
Dr. Joseph M. Dixon, Roanoke, Va.
Dr. Lester Edwin Dunman, Mullens, W. Va.
Dr. Charles H. Eller, University, Va.
Dr. Samuel L. Elfmon, Fayetteville, N. C.
Dr. Carroll E. L. Esterday, Union Bridge, Md.
Dr. Edwin P. Ewers, Pittsburg, Pa.
Dr. Frank W. Foote, University, Va.
Dr. Hunter B. Frischkorn, Jr., Richmond, Va.
Dr. James Quincy Gant, Richmond, Va.
Dr. Romeo Joseph Gentile, Suffolk, Va.
Dr. George Adrian Glass, Richmond, Va.
Dr. H. Aurelia Gill, Richmond, Va.
Dr. William L. Griggs, Jr., Pennington Gap, Va.
Dr. James Martin Habel, Jr., Jetersville, Va.
Dr. Paul Burns Haggland, Seattle, Wash.
Dr. John D. Hamner, Jr., Richmond, Va.
Dr. Herman Henry Hines, Bristol, Va.
Dr. Beverly Long Holladay, Suffolk, Va.
Dr. Charlton G. Holland, Jr., Danville, Va.
Dr. Max Leonard Holland, Chattanooga, Tenn.
Dr. Edward Lee Hopewell, Washington, D. C.
Dr. Floyd Kinzer Hurt, Marion, Va.
Dr. Harold Maurice Jackson, Leesburg, Va.
Dr. Edward V. Jones, Jr., Hampton, Va.
Dr. Charles E. Jenkins, Baltimore, Md.
Dr. Joseph John Kanich, Danville, Va.
Dr. Nathaniel T. Keys, Cornwall, N. Y.
Dr. Robert C. Keys, Staunton, Va.
Dr. Alfred L. Kruger, Norfolk, Va.
Dr. Esta Joyce Levy, Suffolk, Va.
Dr. Rector Sells LeGarde, Damascus, Va.

XUM

Dr. Claude Marshall Lee, Jr., Cincinnati, O.
Dr. Maynard Herman Law, Roanoke, Va.
Dr. Edmund Moseley LaPrade, Richmond, Va.
Dr. Alter Laibstain, University, Va.
Dr. Byrd Stuart Leavell, Culpeper, Va.
Dr. Albert Emanuel Long, University, Va.
Dr. Louis Lovenstein, Richmond, Va.
Dr. Albert Benjamin McCreary, Eastville, Va.
Dr. John Fulton McGavock, University, Va.
Dr. Francis Henry McGovern, Danville, Va.
Dr. William P. McGuire, Baltimore, Md.
Dr. John O. McNeel, University, Va.
Dr. Brooke Baylor Mallory, Roanoke, Va.
Dr. William H. Matthews, Dante, Va.
Dr. Sam Milchin, Richmond, Va.
Dr. Jerome Natt, Roanoke, Va.
Dr. James Talton O'Neal, Amelia C. H., Va.
Dr. Boyd Hawthorne Payne, Dallas, Texas.
Dr. James B. S. Perrow, Altavista, Va.
Dr. William Thomas Pyles, Roanoke, Va.
Dr. Reno Russell Porter, Madison, Wis.
Dr. Dupert W. Powell, Roanoke, Va.
Dr. Jesse J. Porter, Louisa, Va.
Dr. Albert George Rawlins, Portsmouth, Va.
Dr. Welford C. Reed, Richmond, Va.
Dr. Edison E. Ritter, Salem, W. Va.
Dr. Harwood Hugo Ritter, Charlottesville, Va.
Dr. Mason Cole Rowe, Charlottesville, Va.
Dr. William V. Rucker, Bedford, Va.
Dr. Ulvert Ottway Sanders, Hurley, Va.
Dr. Eugene B. Shepherd, Richmond, Va.
Dr. Hyman Rock Sheintock, Richmond, Va.
Dr. James B. Shuler, Shenandoah, Va.
Dr. John R. Saunders, Richmond, Va.
Dr. Hack U. Stephenson, Jr., Richmond, Va.
Dr. Anna Theresa Swing, Richmond, Va.
Dr. William L. Taliaferro, Hampton, Va.
Dr. Waller Littlepage Taylor, Jr., Norfolk, Va.
Dr. Clarry Clyde Trice, Richmond, Va.
Dr. James Carl Trivett, New Orleans, La.
Dr. William R. Tyson, Norfolk, Va.
Dr. Leo Louis Tylec, Hartford, Conn.
Dr. Lewis Alexander Vance, Wabah, Mass.
Dr. Roland Harris Vaughan, Cardwell, Va.
Dr. Angelo Joseph Villani, New Haven, Conn.
Dr. Thomas Duval Watts, Richmond, Va.
Dr. Harold Wayne Ward, Clay, W. Va.
Dr. William R. Watkins, Halifax, Va.
Dr. Arthur Weinberg, New York, N. Y.
Dr. George Clegg Williams, Coeburn, Va.
Dr. Varl Louis Wilson, University, Va.
Dr. Washington C. Winn, Richmond, Va.
Dr. Martin R. Wisely, University, Va.
Dr. Herman Wolff, Lynchburg, Va.
Dr. William Swope Wray, University, Va.

In addition to this list there were five osteopaths granted licenses, four on the basis of examination and one by reciprocity.

The Northampton County Medical Society

Held its regular quarterly meeting on July 3rd, at which time Dr. G. W. Brown, of the Eastern State Hospital, was the chief speaker. He differentiated quite clearly between those mental cases requiring ordinary hospital care and those requiring confinement in an institution.

Three censors were elected for the Society in addition to the officers previously named. They are Dr. G. W. Holland, Eastville, Dr. S. K. Ames, Cape Charles, and Dr. W. J. Sturgis, Nassawadox. Delegate and alternate to the State Society meeting at Norfolk in October were also elected at this time.

The Society gave its unanimous approval to a plan of Hospital Insurance contemplated by the Northampton-Accomac Memorial Hospital. (The plan had been approved individually by the doctors in Accomac County.)

The Medical Societies of Northampton and Accomac Counties are jointly sponsoring a postgraduate course in Pediatrics to be held at the Hospital, July 8th to 19th, inclusive, under the direction of Dr. George M. Lyon.

W. CAREY HENDERSON, *Secretary.*

The Patrick-Henry Medical Society

Held its regular quarterly meeting at Patrick Springs, Va., July 11th. The members and their families had dinner at the hotel preceding the meeting. The program of the meeting consisted of case reports by six of the members, following which there was a general discussion. Dr. F. B. Teague, Martinsville, president, presided.

Delegates and alternates to the State Society meeting in Norfolk were elected at this time.

The next meeting is to be held in October, at Martinsville, Va.

C. R. TITUS, *Secretary.*

The Halifax County Medical Society

Held its regular meeting at South Boston on July 11th, with the president, Dr. I. Keith Briggs, presiding. Papers were presented by Dr. C. C. Steelsmith, head of the Halifax-Pittsylvania Health Department, Dr. C. B. White, Halifax, and Dr. W. C. Brann, South Boston.

Dr. Lloyd Eastlack, South Boston, was elected president for the coming year; Dr. L. H. Hoover, Clarksville, vice-president; and Dr. Wm. C. Brann, South Boston, was re-elected secretary-treasurer.

The Fauquier County Medical Society

Met at Warrenton, Va., July 8th, with Dr. Richard Mason presiding. The delegate and alternate to the State Society were named and the following officers elected and installed: President, Dr. Richard Mason, The Plains; vice-presidents, Drs. George H. Davis and J. E. Knight, both of Warrenton; and secretary and treasurer, Dr. Martin B. Hiden (re-elected), also of Warrenton.

In accordance with a request from the President of the Woman's Auxiliary to the Medical Society of Virginia, it was unanimously voted that an Auxiliary to the Fauquier County Medical Society be formed and a committee was appointed to perfect this organization.

Matters of local interest were also discussed at this meeting.

Lee County Medical Society.

At the meeting of this Society on July 15th, Dr. W. J. Innes, Pennington Gap, was re-elected president and Dr. J. B. Muncy, also of Pennington Gap, was re-elected secretary-treasurer. Dr. W. L. Griggs and Dr. B. C. Grigsby were elected members of the Society.

The Bedford County Medical Society

Held its regularly quarterly meeting at Tanglewood Inn., Bedford, on the night of July 15th, this being a social meeting. The after-dinner program consisted of a showing of films on health work and surgery by E. G. Tice, and a reading by Miss Ruth Wyles, of Abingdon. Those present included Dr. and Mrs. T. P. West, Dr. and Mrs. C. H. Bondurant, Dr. and Mrs. E. L. Johnson, Dr. and Mrs. J. A. Rucker, Dr. and Mrs. M. P. Rucker, Dr. and Mrs. B. A. Rice, Dr. and Mrs. J. G. Leech, Dr. and Mrs. H. R. Hartwell, Dr. James P. Scott, Dr. and Mrs. Turner, Dr. and Mrs. F. G. Repass, Dr. and Mrs. G. W. Parker, Dr. and Mrs. S. K. Wallace, and several other guests.

The Southside Virginia Medical Association

Held its quarterly session at Lawrenceville on June 11th, with Dr. S. E. Gunn, of Hopewell, in the president's chair. Papers were read by Drs. Paul D. Camp, Oscar L. Hite, Thomas Wheeldon, and Frank S. Johns, of Richmond; Dr. S. E. Gunn, of Hopewell, and Dr. M. H. Todd, of Norfolk. A business session followed after which there was a buffet supper at the Windsor Hotel.

News Notes

Advances in Obstetrics and Gynecology.

In the July issue of the MONTHLY we published a page giving replies received to time of publication from a number of obstetricians and gynecologists on "What do you consider the three most significant advances in the field of obstetrics and gynecology during the past ten years?" The following answers received since that time should add to the interest of that page:

1. **Organized prenatal care.**
2. **Hospitalization.**
3. **Compulsory consultation in abnormal cases.**

Carl H. Ill, Newark, N. J.

1. **A mask that covers the mouth and nose should be worn by all attendants during active labor.**
2. **The prevention of congenital syphilis.**
3. **Providence is a safe obstetrician in the great majority of cases.**

James R. McCord,
Emory University School of Medicine,
Atlanta, Ga.

1. **Increased efficiency in preventing complications of pregnancy and labor.**
2. **Increased knowledge of sexual physiology and pathology, leading to decrease in ineffective operations.**
3. **Creating foundation for rational treatment, decreasing operative mortalities.**

Willard R. Cooke, Galveston, Texas.

1. **The Aschheim-Zondek test.**
2. **X-ray pelvimetry.**
3. **The active principle of ergot.**

James Raglan Miller, Hartford, Conn.

The Norfolk Meeting

Of the State Society is less than three months off. Plans are in the making for an interesting and pleasant meeting there as always. A good attendance is expected and we urge members to make hotel reservations as soon as possible to insure being in the location of choice. The Norfolk hotels are the Monticello, Southland, Fairfax, Atlantic, Lorraine, and the rates range from $2.00 a day and up.

XUM

In the July issue we gave names of our two special guests. The symposium has been selected with a view of having a subject of very general interest and is on treatment of some common diseases, subdivided as follows:

(a) Treatment of Acute Respiratory Diseases by Dr. F. C. Rinker, Norfolk;

(b) Treatment of Acute Infections of the Upper Urinary Tract by Dr. Joseph F. Geisinger, Richmond;

(c) A More Rational Treatment for the Mental Patient by Dr. H. C. Henry, Petersburg; and

(d) Treatment of the Toxemias of Pregnancy by Dr. T. J. Williams, University.

These papers and the discussion of them should furnish something of interest for every member of the Society.

In June, cards were sent all members requesting that those desiring to present papers at the meeting send titles with abstracts. Please bear in mind that August 20th is the dead line set for the receipt of these.

In the business sessions there will be a discussion of matters of interest to all members. Local societies are asked to elect their delegates and alternates and send names to the Secretary of the Society at 1200 East Clay Street, Richmond, as soon as possible. We want a large representation and are counting on the cooperation of each member.

Have You Returned Your Questionnaire?

A month ago, a questionnaire was sent all members of the Society by the President and the Committee on Medical Economics of the Society, to secure an opinion from the doctors of the State as to the distribution and adequacy of medical care in the State, and to ascertain the sentiment of Virginia doctors as to what, if anything, should be done in this matter. From the answers received, the Committee will formulate its report to be presented to the House of Delegates at our Norfolk meeting.

Have you filled out and returned your questionnaire? If not, please look it up and return today.

Married.

Dr. Oliver Allison Ryder, Alexandria, Va., and Miss Elinor Temple Hill, Richmond, Va., July 6th.

Dr. Fletcher Johnston Wright, Jr., formerly of Petersburg, Va., but now of Princeton, W. Va., and Miss Martha Jeanette Andrews, Lynchburg, Va., June 29th. Dr. Wright graduated from the University of Virginia in 1934 and interned at the University of Virginia Hospital.

Dr. Charles Roy Hoskins, formerly of Saluda, Va., but now of Athens, Ohio, and Miss Virginia Eubank Segar, Saluda, Va. Dr. Hoskins is a member of the class of '27, Medical College of Virginia, and has recently served a residency at the Manhattan Eye, Ear and Throat Hospital in New York City.

Dr. Charles Morris Nelson and Miss Charlotte Mercer Purcell, both of Richmond, Va., July 16th. Dr. Nelson is a member of the class of '32, University of Virginia, and is at present serving as an assistant resident in surgery at the Medical College of Virginia Hospital Division.

Dr. Charles Neil Eckerson, class of '35, Medical College of Virginia, and Miss Susan Elizabeth Henderson, Milford, Va., June 15th. Dr. Eckerson was formerly of Charleston, W. Va., and is now interning at Holy Name Hospital, Teaneck, N. J.

Dr. Clarence Ivanhoe Butte, Jr., Matoaka, W. Va., and Miss Ruby Binford Hudson, South Hill, Va., June 15th. Dr. Butte graduated from the Medical College of Virginia last year and interned for the past year at the Bluefield Sanatorium, Bluefield, W. Va. He will be located for practice at Maybeury, W. Va.

Dr. Lewis Littlepage, Jr., Norfolk, Va., and Miss Eleanor Mattingley, Remington, Va., June 29th. Dr. Littlepage is a graduate of the University of Virginia, in 1934, and served his internship at the University Hospital. He will be located in Norfolk, Va.

Dr. Virgil Leonidas Kelly, of the staff of the Blue Ridge Sanatorium, Charlottesville, Va., and Miss Alberta Worrell, of Otey, Va., June 11th.

Dr. Wycliffe Charles Jackson, class of '28, Medical College of Virginia, now of Jenkinjones, W. Va., and Miss Mary Stuart McCallum, Rowland, N. C., June 1st.

Dr. Edwin J. Palmer,

Who interned at Hamot Hospital, Erie, Pa., after his graduation from the Medical College of Virginia last year, has gone to Gardner State Colony, East Gardner, Mass., where he will be an assistant physician on the staff of that institution.

Dr. **Martin B. Hiden,**

Warrenton, Va., sailed for Europe on July 16th, and will spend his vacation visiting France, Italy, Switzerland, England, and Scotland, returning to this country about the 26th of August.

Medical College of Virginia News.

Dr. Albert C. Broders, of the Mayo Clinic, has accepted the position of professor of surgical pathology and director of cancer research, effective in August. Dr. Frank L. Apperly will continue as head of the department of general and physiopathology. Dr. Broders is a member of the class of '10, Medical College of Virginia and was awarded the degree of D. Sc. by the College at its Commencement Exercises in 1929.

Dr. William B. Porter, professor of medicine, is spending about two months in Puerto Rico making a study of the adjustment mechanisms occurring in the circulatory apparatus in chronic anemias associated with parasitic infections. Dr. Ramon Suarez, of Puerto Rico, will be associated with Dr. Porter in this investigation and will deal primarily with the physical and chemical changes in the blood. While in Puerto Rico, Dr. Porter will give a series of lectures and clinics.

The fifth Saint Philip Hospital postgraduate clinic for Negro physicians was held June 17-29. Forty-one physicians matriculated in this clinic, representing the states of Kentucky, North Carolina, South Carolina, Texas, and Virginia. The clinic is subsidized by the General Education Board of New York.

Bids for the new central heating plant and electrical distribution system to cost $130,000.00 were opened on July 2. This work is being done under a federal loan and grant.

Dr. Frank L. Apperly, professor of pathology, will spend July in Europe visiting various hospitals and clinics.

Miss Mary Alice Riley has been appointed head of the Social Service department. She came to the institution from the Lying-In Hospital of New York City.

News from the University of Virginia, Department of Medicine.

On June 10th Dr. Oscar Swineford gave a report on Instruction in Allergy in Medical Schools of the United States before the Association for the Study of Allergy.

On June 11th Dr. L. T. Royster read a paper on Body Type in Negro Children before the Section on Pediatrics of the American Medical Association at Atlantic City.

Drs. D. C. Smith, W. A. Brumfield and E. E. Barksdale were awarded a Certificate of Merit Class II for their exhibit illustrating Practical Epidemiology of Syphilis during the recent meeting of the American Medical Association at Atlantic City.

Dr. Robert V. Funsten was elected Secretary of the Section on Orthopedic Surgery of the American Medical Association at tl meeting in Atlantic City.

News Notes from the Duke University School of Medicine.

At the graduating exercises held at Duke University, June 3rd, forty-seven medical students received the degree of Doctor of Medicine and seven the degree of Bachelor of Science in Medicine. At the same time, nineteen nurses received their diplomas in Nursing.

On June 8th the spring quarter of the school of medicine ended and the summer quarter commenced June 17th with fifty-eight students registered here or elsewhere for credit at Duke. One of these is studying in London and Dublin, for which he will be given credit here.

During the spring quarter the following seniors were elected to membership in Alpha Omega Alpha: Charles E. Leach, Ben N. Miller, Jr., Ralph K. Shields and Robert B. Stith, Jr.

One June 20th the following talks were given by members of the faculty: Dr. E. P. Alyea on Urological Back Pain, and Dr. R. A. Ross on the Significance of Gynecological Pain, at the meeting of the Sixth District Medical Society, at Burlington, N. C., and Dr. Bayard Carter on Occipital Posterior Presentation, Eclampsia and Obstetrical Anaethesia at the meeting of the Rockingham County Medical Society, at Reidsville, N. C.

XUM

Dr. Hyman Cantor,

Petersburg, Va., was appointed by Governor Peery as a delegate to represent the Commonwealth of Virginia at the ninth session of the Institute of Public affairs recently held at the University of Virginia.

Dr. J. E. K. Flannagan

Is now at Blacksburg, Va., where he is medical officer in charge of the Montgomery Transient Camp.

The American Psychiatric Association

Announces the removal of its offices to the New York Academy of Medicine, 2 East 103rd Street, New York City. This location is accessible and offers many advantages to the officers and staff of the Association.

Dr. S. L. Rucker,

An alumnus of the Medical College of Virginia in the class of '30, formerly of Moneta, Va., after a residency at the Medical College of Virginia Hospitals, Richmond, has located for practice at Elkview, W. Va.

Dr. John A. Gibson,

Leesburg, Va., was recently installed as president of the Leesburg Rotary Club for the coming year.

Dr. Guy R. Harrison,

Richmond, Va., has been re-appointed by Governor Peery as a member of the State Board of Health for a term of seven years, effective July 1st.

Dr. Harry Golston,

Roanoke, Va., has been taking postgraduate work in diseases of the heart at Harvard University Medical School.

Dr. M. T. Plyler,

Who interned at St. Vincent's Hospital, Norfolk, Va., last year, is now on the staff of the North Carolina Sanatorium, at Sanatorium, N. C.

Dr. Richard S. Herring,

Assistant to Dr. A. L. Herring at Grace Hospital, Richmond, Va., left in July for Vienna, where he expects to spend a year in postgraduate work in obstetrics and gynecology at the University of Vienna. On his return he will resume his post on the general staff at the Grace Hospital. Dr. Herring is an alumnus of the Medical College of Virginia, class of '32.

Dr. J. Paul Kent,

Who interned at Roanoke Hospital, Roanoke, Va., last year, has located on Williamson Road, Roanoke, Va., for the general practice of medicine. Dr. Kent is a member of the class of '34, Medical College of Virginia.

Dr. Robert D. Croom, Jr.,

Class of '34, Medical College of Virginia, has located for general practice at his former home in Maxton, N. C. He served an internship at the Johnston-Willis Hospital, Richmond.

Dr. L. R. Staton,

After serving an internship at the Lynchburg General Hospital, Lynchburg, Va., has located for practice at Murphy, N. C.

Dr. C. G. O'Brien,

Who graduated from the Medical College of Virginia in 1934, has located at Appomattox, Va., where he is engaged in general practice. Dr. O'Brien served a junior internship at Sheltering Arms Hospital, Richmond, and was at Gallinger Municipal Hospital, Washington, D. C., last year.

Dr. F. T. Hauser,

Recently engaged in practice at Bland, Va., is now connected with the CCC camp at Chaneysville, Pa.

Dr. William R. Pretlow,

Class of '34, Medical College of Virginia, who interned for the past year at Memorial Hospital, Richmond, has located at The Plains, Va., where he is engaged in general practice.

Dr. Thomas M. Winn,

Covington, Va., has been advised that he successfully passed the examinations of the American Board of Otolaryngology before which he appeared at the Manhattan Eye, Ear, Nose and Throat Hospital of New York City, in June.

Dr. Paul Q. Daniel,

Recently of Deltaville, Va., has moved to Highland Springs, Va., where he has taken over the home and practice of the late Dr. James T. Leftwich.

Dr. Frank H. Mayfield,

Class of '31, Medical College of Virginia, and for sometime resident in neurology at the Medical College of Virginia Hospitals, has gone to Louisville, Ky. His offices will be in Brown Building where he will continue practice in the specialty in which he has been working.

Dr. and Mrs. Archer A. Wilson,

Charleston; W. Va., sailed on the *Europa* on July 10th, for a visit abroad. Dr. Wilson expected to attend the Second International Neurological Congress at London on July 29th-August 2nd, following which he will spend four weeks visiting various European clinics. Dr. Wilson is a member of the class of '23, Medical College of Virginia, and later did special work at the Medical College of Virginia hospitals.

Dr. William R. Weisiger,

Lieutenant-Colonel in the Medical Reserve and executive officer of the 305th medical regiment, 80th Division, has just returned from Carlisle Barracks, Pa., where he spent two weeks in active duty with his regiment at the Medical Field Service School.

Examination for Associate Director of Bacteriological Laboratories, Health Department of New York City.

The Municipal Civil Service Commission of New York City will in the near future conduct an examination for the position of Associate Director of the Bacteriological Laboratories, Health Department.

The salary of the position is $6,000 per annum and the duties of the incumbent will be to assist the director of the laboratories in the executive supervision of one of the largest and most important laboratories of its kind in this country.

The examination is open to all qualified citizens of the United States. Those who do not live in New York City may obtain applications by forwarding a properly stamped and self-addressed envelope to the Municipal Civil Service Commission, Application Bureau, Room 1403, Municipal Building, New York City. Applications must be filed in the offices of the Commission before September 3, 1935, at 4 P. M.

Dr. William S. Lloyd,

Who graduated from the Medical College of Virginia last year and has since interned at the Medical College of Virginia Hospitals in Richmond, has located at R. F. D. 2 from Bumpass, Va., where he is engaged in general practice.

Dr. Ralph J. Sykes,

Who interned at Buxton Hospital, Newport News, Va., after graduation from the Medical College of Virginia in '34, has returned to his former home at Jackson, N. C., and is on duty at the CCC camp at that place.

Resigns as Dean at Georgetown.

Dr. William Gerry Morgan resigned as dean of Georgetown University School of Medicine, effective July 1st, after having filled this position for four years. Dr. Morgan will continue his connection with the school, however, as regent of the University and professor of gastro-enterology, a position he has held for a quarter of a century.

Dr. Sterling Ruffin,

Washington, D. C., was recently elected president of the Medical Society of the District of Columbia for the coming year and Dr. Coursen B. Conklin was re-elected secretary.

Dr. A. P. Traynham,

Richmond, Va., who has been absent from the city for three months because of illness, has resumed his practice at 2618 Grove Avenue.

Dr. J. E. Gladstone, Jr.,

Has located at his former home, Exmore, Va., for the general practice of medicine. He graduated from the University of Virginia in 1934 and interned last year at St. Vincent's Hospital, Norfolk, Va.

Dr. Samuel H. Garst

Has located in Staunton, Va., with offices at 112 West Frederick Street, where he will limit his work to surgery and orthopedics. Dr. Garst graduated from the University of Virginia in 1931 and has recently completed a residency in surgery at the Baltimore (Md.) City Hospital.

Souvenir Booklet on Mexico.

The Southern Medical Association has adopted the plan of having a post-convention trip to some interesting place, each year, and, following the San Antonio meeting in 1934, the visit was to Mexico. This tour was planned and personally conducted by Mr. C. P. Loranz, secretary-manager of the Association. While on this outing he collected a number of photographs of the official party and places visited and has incorporated them in brochure form —a lovely souvenir intended primarily for those who were on the tour.

XUM

Dr. George E. Waters,

Who has been acting director of the Peninsula Health District with headquarters at Williamsburg, Va., was made director of this work on July 1st.

The New York Academy of Medicine

Will hold its Eighth Annual Graduate Fortnight on October 21st to November 2nd. The subject for discussion will be Diseases of the Respiratory Tract, and the profession generally is invited to attend. The registration fee of $3.00 admits to all features of the Fortnight. Further information may be obtained from the Academy at 2 East 103rd Street, New York.

Physician Wanted.

The MONTHLY is advised that a physician is needed at Eggleston, Va., and that this should be a good opening for an alert doctor. Any one interested might communicate with Mr. E. B. Smith, Eggleston, Va.

Another location needing a physician is Bentonville, Va. This community is without a doctor. Further information may be obtained from Mrs. Ada R. Fristoe, Postmaster at Bentonville.

Obituary Record

Dr. Calvin Graham Dold,

Buena Vista, Va., died June 22nd, of coronary thrombosis. He was a native of Lexington, Va., and was sixty-five years of age. Dr. Dold received his medical degree from the University of Maryland in 1891, and had practiced in Rockbridge County for about forty-five years. He had been a member of the Medical Society of Virginia for thirty-six years. His wife and five daughters survive him.

Dr. George E. Wiley,

Bristol, Va., died March 25th. He was eighty-three years of age and graduated from the University of Maryland, Department of Medicine, in 1875. Dr. Wiley was city health officer of Bristol at the time of his death. He had been a member of the Medical Society of Virginia for fifty-one years.

Dr. Daniel Malloy Prince,

Mt. Vernon, Washington, died suddenly on April 10th. He was thirty-seven years of age and graduated from the University of Virginia, Department of Medicine, in 1924. Dr. Prince was a member of the Medical Society of Virginia, having joined while located in this State.

Dr. Thomas McCrae,

Prominent physician of Philadelphia, died June 30th. He was a native of Canada and was sixty-four years of age. At the time of his death, Dr. McCrae was Magee professor of practice of medicine and clinical medicine at the Jefferson Medical College. He was associated with the late Sir William Osler and collaborated with him in the writing of several well-known medical books.

Dr. William Brodnax Banister,

Colonel, U. S. Army, retired, Petersburg, Va., died May 1st, of coronary thrombosis. He was seventy-three years of age and a graduate of the Hospital College of Medicine, Louisville, Ky., in 1883.

Dr. Carl Atkins Foster,

Columbia, S. C., died May 15th, of coronary occlusion. He was fifty-six years of age and a graduate of the class of '04, Medical College of Virginia.

Dr. James Heiskell Carpenter,

Salisbury, Md., died May 20th, at the age of sixty-one. He was a graduate of the University of Virginia, Department of Medicine, in 1897.

Dr. John A. B. Sinclair,

Miami, Fla., died May 19th, of chronic myocarditis. He was fifty-six years of age and a graduate of the University of Virginia, Department of Medicine, in 1901.